ARIZONA MEDICINE

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ARIZONA MEDICINE
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Original ARTICLES

LOCAL AND REGIONAL ANALGESIC INJECTIONS IN PAINFUL MUSCULOSKELETAL CONDITIONS

Otto Steinbrocker, M. D.

New York City

INTRODUCTION: In many musculoskeletal disorders the general and local symptoms frequently are dominated by persistant pain and disability which fail to respond to systemic and local measures. A vicious circle of pain, muscle spasm, disability and even deformity often appears to be produced and perpetuated to a great extent by the intractable discomfort. Owing to the dynamic role played by localized pain, as well as the need for its relief, there has been an extensive search for some direct method of abolishing pain, or at least to minimize it until the usual measures achieve their more gradual effects. The principles and techniques of regional and local anesthesia and analgesia, therefore, have been widely adapted to neuromusculoskeletal conditions for these purposes.

RATIONALE AND ACTION OF ANALGESIC INJECTIONS: The rationale of these procedures simply is to interrupt the pain circuit by local injections at the site of pain or irritability, at the origin of pain radiation or, finally, at the source of nerve supply to the involved part(regional or paravertebral). Usually one or two hours or more of local anesthesia follows. It is a generally accepted empirical observation that in many cases analgesia continues long after the anesthesia disappears. Varying degrees of analgesia often persist for one or several days to weeks, or permanently, when procaine solution or a related subsance has been administered at the proper location with correct techinque. The degree of response and duration of relief depend on the nature of the underlying pathology or disturbed physiology.

TYPES OF ANALGESIC PROCEDURE. Procaine solutions may be administered for relief of pain as *regional blocks* by the *paravertebral* route to infiltrate spinal or sympathetic nerves and ganglia, cranial nerves and ganglia, or to anesthetize the nerve supply to a region or part, as at the brachial plexus, or even to infiltrate special muscles such as the scalenus anticus. Subdural or epidural administration is done in some cases. Alcohol may be employed for lasting effects. All of these procedures require special training.

Local block is the infiltration of procaine or related solution at the site of palpable maximum tenderness, at a "triggerpoint", or about a peripheral nerve trunk. It is a simple procedure safe to carry out with ordinary precautions and skill.

Intravenous procaine solution recently has been advocated for the treatment of arthritis and other neuromusculoskeletal disorders. Our experience with this method in a controlled study has been quite unsatisfactory.

Eythl Chloride Spray is used for surface anesthesia and analgesia by freezing peripheral, painful and tender areas. Sometimes it produces prolonged relief of pain.

DIAGNOSTIC INJECTIONS of procaine solution provide valuable aid when correctly carried

Read before Arizona Chapter American Academy of General Practice, Sixteenth Annual Meeting Arizona Medical Association, Tucson, Arizona, April 30, 1951. From the Rheumatology Dep't., Hospital for Joint Diseases and Lenox Hill Hospital.

out. They are employed for confirmation in the scalenus anticus syndrome, bicipital tendinitis, pyriformis and sciatic syndromes, and in a variety of other clincial pictures by intramuscular, peritendinous or perineural infiltration; to establish localization of maximum tender points or "trigger points" by spot injections of the affected intramuscular or supportive structures. They may be utilized to confirm the diagnosis or the possible effectiveness of later alcohol blocks or sympathectomy, by paravertebral spinal nerve block, or sympathetic ganglion block with procaine in suitable cases.

THERAPEUTIC INJECTIONS: The therapeutic injection of analgesic solutions for musculoskeletal pain is carried out, following thorough examination to identify the source of pain, particularly visceral disease, after at least a tentative diagnosis has been made and when localizing signs are present. In such situations analgesic injections may prove a valuable adjunct, when the usual measures have failed to relieve pain, muscle spasm, stiffness, or disability. In traumatic, degenerative and "idiopathic" irritative processes of periarticular tissues and nonarticular supportive structures,—muscles, ligaments, tendons, bursae and nerves, in the neck, back and extremities—correct injection therapy frequently provides palliation and contributes to lasting relief. Inflamed joints or periarticular structures are not injected. Intraarticular infiltration is rarely required or carried out by us.

PRINCIPLES OF LOCAL ANALGESIA: In general, for those not trained in regional anesthesia, the safest rule is to inject only sore points that can be localized with the palpating finger. The point or points of maximum tenderness should be found and marked. Pressure there may reproduce the pain and radiation. The injecting needle may reprovoke the pain and its radiation when it penetrates the tender spot. Infiltration with procaine may partly or entirely abolish the signs and symptoms within 5-10 minutes. Points of lesser soreness are not injected. Skin hyperesthesia should be determined by pinch or scratch over the tender spot, lest it be part of a larger area of superficial hyperesthesia. A simple skin wheal is made for entry of the deep injection. A preliminary subcutaneous introduction of a few c.c. of normal saline solution serves as a useful control. No more than 5 c.c. of ½% procaine solution (or similar substance) is injected at first to be sure of the patient's tolerance. Inadequate relief after 2-3 infiltrations requires a search for better localization of the point of maximum tenderness, consideration of a regional block or reexamination of the signs and the diagnosis.

Dosage and Frequency of injection of procaine depend on the extent of tissue to be infiltrated and the severity of the pain and disability. At the first session we use no more than 5 c.c. of ½% solution. In peripheral tissues 2-20 c.c. of ½% or 1% procaine solution may be employed subsequently. In acute traumatic lesions 3-5 daily injections sometimes become necessary. In chronically painful disorders two injections a week suffice until improvement occurs, then once every 5-7 days. It is unnecessary to persist until pain and disability are completely abolished. When these symptoms are greatly improved, simpler adjuncts,—oral analgesics, physical modalities and exercises, are relied on to complete the recovery.

HAZARDS AND PRECAUTIONS IN REGIONAL AND LOCAL BLOCKS

Major Procaine Hazards consist of accidental intravenous injection of a large amount and hypersensitivity even to a small dose. Previous history-taking is helpful.

Minor Procaine Reactions are encountered in up to 30% of patients. They consist of any one or more of the following: slight dizziness, pallor, sweating, tachycardia, palpitation, weakness, nausea, "remoteness", occasionally fainting. These symptoms appear within 5-15 minutes after the injection, but they may be delayed for a few hours. Sometimes it is difficult to decide whether the reaction is due to hypersusceptibility or simple fright. The possibility of these reactions always should be mentioned tactfully in advance. Should any of them occur, it is taken for granted by the patient.

Use of Barbituates, 1 1-2 gr. orally an hour before treatment is a routine premedication. For emergency, in case of accidental intravenous injection of a large amount of procaine, or for symptoms of severe procaine hypersensitivity, an ampule of one of the intravenous barbiturate preparations, such as sodium evipal or sodium pentobarbital should be kept handy for quick use if necessary.

Relaxation of the patient is assured by placing her in the most comfortable position for the procedure.

Aspiration, when the needle is in place, is always done before injecting and is repeated intermittently during infiltration, to be sure the needle-point has not entered a blood vessel. If blood returns, the needle is withdrawn and gentle pressure is used for a minute or so. The puncture is repeated then at a short distance from the first point of penetration and administration of the dose completed. Too superficial injection is followed by bulging. It may alarm the patient unless it has been mentioned.

Relief of "after-pain" may be required when soreness at the injection site occurs for several hours or longer following treatment. This symptom is apt to be transient, otherwise it is relieved by a hot water bottle or warm bath followed by gentle massage at the site.

Care in inserting the needle should always be exercised by directing it slowly and gently with a minimum of manipulation to avoid traumatizing tissues, especially blood vessels and nerves. Rarely, when these precautions are not observed, a needle-point is broken and embedded in periosteum.

Aseptic Precautions should be followed at all times. Before making each wheal a generous circle of skin, over and about the point to be penetrated, is cleansed with pure alcohol.

Fresh, undeteriorated solutions without adrenalin are used, and they are kept at room temperature.

RESULTS

These measures have proved effective in a variety of musculosketal disorders unresponsive to other treatment and compared with control observations. The more definite the objective signs associated with pain, the greater is the reliance to be placed on the effects of analgesic procedures. Demonstrable, anatomically consistent tenderness, hyperesthesia, muscle spasm, and limitation of function offer tangible evidence for diagnosis and localization. Such signs also serve as criteria by which therapeutic response can be gaged without depending upon the patient's opinion. The results are not uniform for all the conditions amenable to such therapy, and depend on the type and severity of the varied disturbances treated by these methods. In local disorders, or in regions where nerves are accessible, the outcome is likely to be highly satisfactory in over 70% of the cases. Successful therapy in conditions like backache, for example, depends as much on the correct diagnosis and localization of the seat of trouble as upon the analgesia itself. In early degenerative arthritis of a knee with secondary irritative phenomena about the joint, periarticular injection proves more helpful than in advanced articular disorganization where effects are too brief to be useful. Infiltration of soft tissue lesions, which provide reliable localization and can readily be reached by the needle, gives a high frequency of lasting relief, if they are primarily local processes rather than referred symptoms.

COMMON CAUSES OF UNSUCCESSFUL TREATMENT

As with many empirical measures the margin of failure varies with the skill and enthusiam of the observer. Careful diagnosis. localization and technique make for better results and fewer reactions. An unsatisfactory outcome is the rule when procaine solution is administered under the following circumstances: advanced pathology of joints or soft tissues; in patients with uncorrected defects in body mechanics; wrong diagnosis or localization of the source of pain; distant referred areas of pain transformed into areas of temporarily deferred pain; undiagnosed multiple lesions; unrecognized superficial hyperesthesia; somatizations and conversion syndromes.

THE PLACE OF ANALGESIC INJECTIONS IN MUSCULOSKELETAL DISORDERS

Procaine solution is. of course, not a solvent for deranged or degenerated tissue. Although a highly diffusable preparation, it cannot be expected to trap vague, intractable aches and discomforts. These analgesic procedures are indicated only after proper examination and at least a tentative diagnosis. Except when acute discomfort of definite musculoskeletal origin must be relieved, the usual accepted therapeutic measures first should be permitted a fair trial.

Analgesic injections or blocks,therefore, are employed as highly selective procedures, alone or as adjuncts to other medical measures or physical modalities. In our experience about 20% of consecutive patients with locomotor disorders are suitable for diagnostic or therapeutic procaine administration. The proper use of these procedures accelerates and amplifies the effectiveness of our resources in the differentiation and management of painful musculoskeletal conditions.

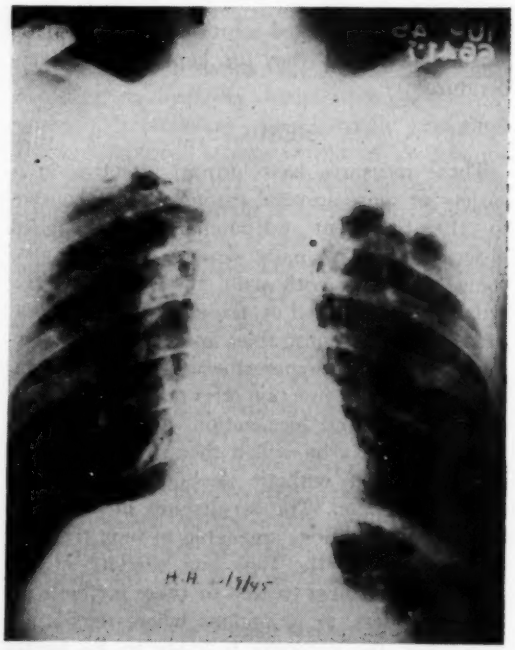
CARCINOMA OF THE LUNG ASSOCIATED WITH CHRONIC PULMONARY DISEASE

I. Walzer, M. D.
Whipple, Arizona

The basis of this report is a study of twenty-eight cases of carcinoma of the lung admitted to the Whipple Veterans Hospital in the five years prior to July. 1951. Thirteen of these have been in the past year. During this five-year period the total of all carcinomas was seventy-two. The figures are incomplete but the proportion of lung cancers to other type of carcinoma is significant.

Of the twenty-eight patients with carcinoma of the lung thirteen had chronic pulmonary disease. There were five with pulmonary tuberculosis but only one with active tuberculosis, four with asthma, three with bronchiectasis, one with pneumoconiosis, and one with moderately severe emphysema. Emphysema was present in most of the thirteen patients in varying degree. Of the twenty-eight patients, six (21%) had resectable lesions, and of the six, two had chronic lung disease, one asthma and the other bronchiectasis. Four of the twenty-eight patients had so much non-malignant pulmonary disease as to preclude surgical treatment of the carcinoma. One of the four had far advanced active tuberculosis and three had very severe pulmonary fibrosis and emphysema with asthma. Of the thirteen patients with bronchogenic carcinoma complicating their previous respiratory disease, three had no definite symptoms referable to carcinoma of the lung, and separable from those complaints caused by their pre-existing disease. One of these had a small unsuspected bronchogenic carcinoma which was found at post mortem examination. The other ten patients had a definite change in symptoms, including recurrent respiratory infections, hemoptysis, weight loss, increasing cough and chest pain. The new symptoms had been present for from three months to one year. All of these patients were admitted to the hospital with an admitting diagnosis of pulmonary disease, whereas of the group of fifteen without pre-existing chronic lung disease five were admitted with no pulmonary diagnosis, one peptic ulcer, one arthritis, two heart disease and one paroxysmal auricular fibrillation. Three patients, all in the past year, were referred to the hospital after local chest x-ray survey, two of them being in the group with pre-existing lung disease. A few illustrative cases of bronchogenic carcinoma are presented.

CASE I: H. H. This fifty-three year old white male was admitted to Whipple October 8, 1945. The patient had noted cough, chest pain and weight loss for eight months before admission. Physical examination on admission showed emaciation, dullness and rales over the upper half of the chest bilaterally and clubbing of the fingers. Sedimentation rate was markedly elevated. There was a mild anemia. Sputum smears were persistently positive for acid fast bacilli. X-ray showed far advanced bilateral tuberculosis. In August, 1946, a small round lesion was noted in the right upper lobe, and as seen on serial films grew progressively larger. The patient refused diagnostic studies but it was apparent clinically



CASE I:

Fig. 1-a. Chest film on October 9, 1945 reveals infiltration in both upper lobes with cavitation, and scattered infiltration bilaterally.

Reviewed in the Veterans Administration and published with the approval of the Chief Medical Director. The statements and conclusions published by the author are the result of his own study and do not necessarily reflect the opinion or policy of the Veterans Administration.

From the Department of Medicine, Veterans Administration Center,, Whipple, Arizona.

Read at Regional Meeting of the American College of Physicians, Phoenix, September 29, 1951.

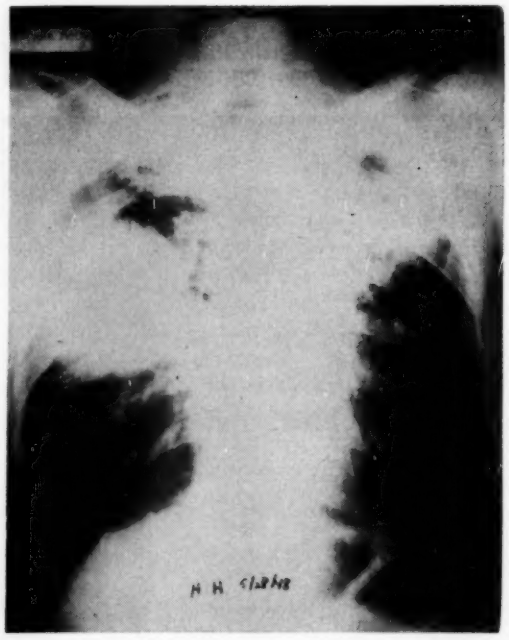


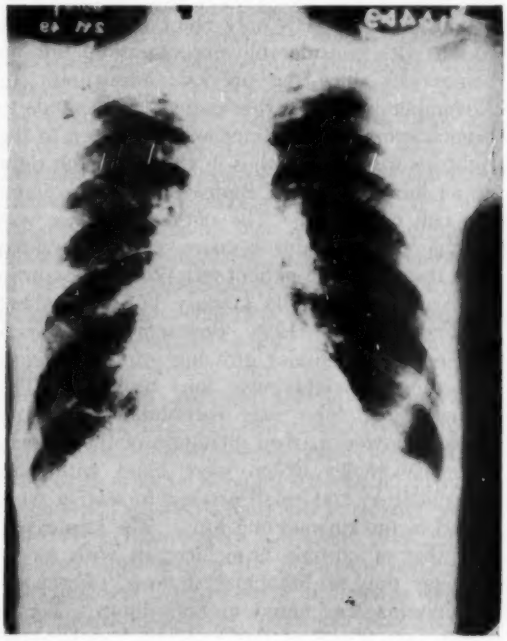
Fig. 1-b. May 28, 1948—A large "cannon ball" shadow is seen in the right mid lung field and there is increase in the infiltration in both upper lobes.

that he had carcinoma of the lung. Shortly before death in January, 1949 he developed localized convulsions. Post mortem examination showed bilateral cavitary pulmonary tuberculosis and a carcinoma of the right upper lobe with metastases to the adrenals and brain.

CASE II. J. J. H. This sixty-one year old white male had a history of asthma since 1933, with numerous hospitalizations over the past fifteen years for frequent chest colds and bronchitis. During that time shortness of breath became progressively worse with progressive weight loss, and several physical examinations during this period revealed marked emphysema with a constant finding of bilateral wheezes and rales.

In January of 1949 the patient was hospitalized at the Veterans Hospital, Wood, Wisconsin, with a complaint of pain in the left lower chest associated with respiration, increased cough and hemoptysis present for a few days and slight fever. Physical examination showed marked emphysema, bilateral wheezes and rales, and a friction rub over the left chest, clubbed fingers and emaciation. Chest x-ray showed emphysema and fibrosis, with a slight pneumonitis in the right and left lower lung fields. Sputum studies were negative. The patient improved on penicillin but refused bronchoscopy and bronchography.

In August of 1949 the patient had a G-I series



CASE II:
Fig. 2-a. Chest film on February 11, 1949 shows pulmonary fibrosis and emphysema with pneumonitis in both lower lung fields.

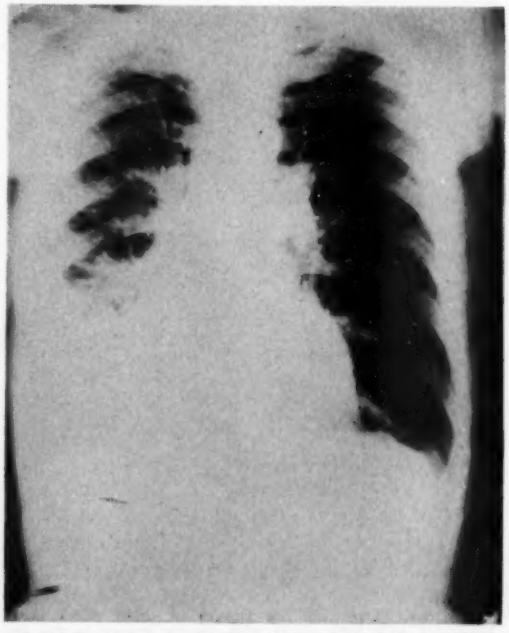
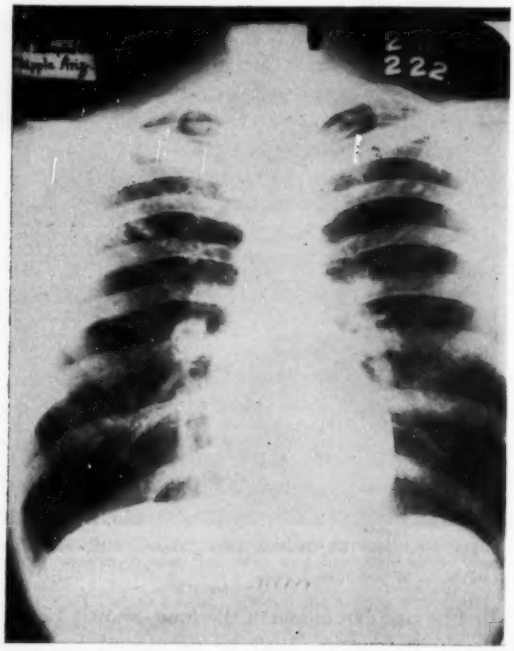


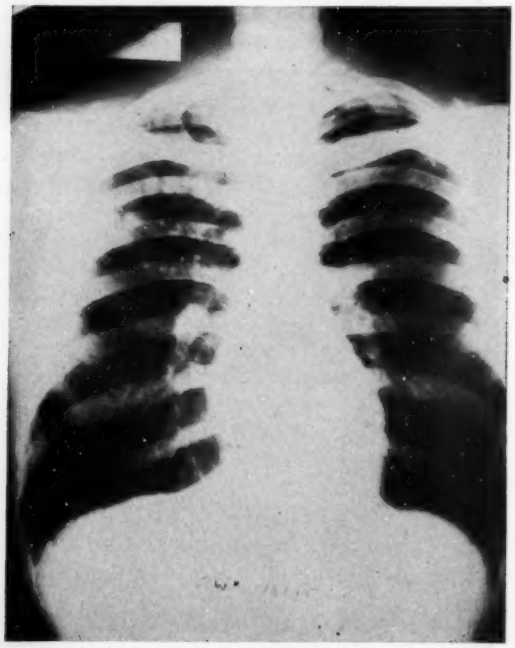
Fig. 2-b. August 11, 1949—A confluent infiltration is seen in the right lower lobe.

for abdominal complaints and fluoroscopy showed a density at the right base, the patient being returned to the hospital. At this time he showed low grade fever, leukocytosis and elevated sedimentation rate. His only chest complaint was cough with considerable expectoration, but no hemoptysis since the previous admission. In November of 1949 the patient consented to bronchoscopy and a tumor mass was seen in the right main stem bronchus just distal to the right upper lobe bronchus. Biopsy showed a squamous cell carcinoma. The patient's disease was considered inoperable because of the associated lung disease. The patient left Wood, Wisconsin and came to Whipple January 17, 1950, where he died March 11, 1950. Post mortem examination revealed a tumor growing into and almost occluding the right lower lobe bronchus. The entire lower lobe was consolidated and on section showed marked dilatation of the bronchi and bronchioles which were filled with pus; consolidation and small abscess formation were found in the surrounding lung. The impression was that of chronic bronchiectasis with recent changes due to bronchial stenosis. Extensive emphysema was noted in both lungs. Tumor tissue was found in the regional lymph nodes and the liver.

CASE III. F. W. This white male was first admitted to Whipple April 15, 1947 at the age



Fib. 3-b. February 18, 1948—There is contraction of the fibrous lesions in the right upper lobe.



CASE III:
Fig. 3-a. Chest film on October 2, 1945 shows pleural thickening over both apices with fibrotic lesions in the right 2nd and 3rd anterior interspaces and calcific lesions overlying the left 2nd anterior rib.

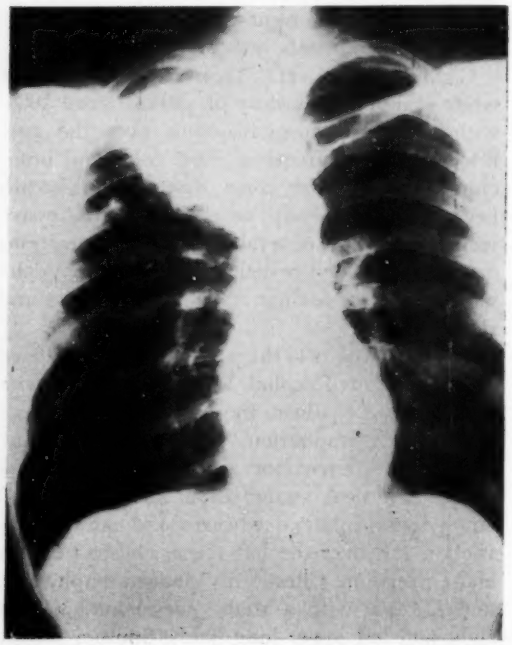
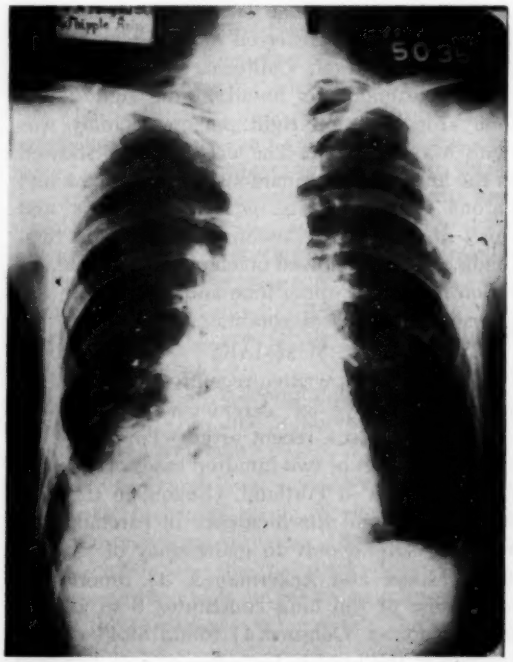


Fig. 3-c. January 10, 1950—A large mass is seen in the right upper lobe.

of twenty-seven. Pulmonary tuberculosis had been diagnosed while the patient was in the Army after his return from a German prison camp. X-ray here showed a fibrotic area in the right upper lobe with a healed lesion in the left upper lobe. Physical examination was essentially negative. No acid fast bacilli were found and the patient was discharged with a diagnosis of arrested pulmonary tuberculosis March 23, 1948, after completing a program of graduated exercise under observation. He was hospitalized for observation during February and March of 1949 and continued as an arrested case. January 6, 1950 he was readmitted with a diagnosis of reactivated pulmonary tuberculosis. He complained of pain in the right upper chest, weight loss and difficulty in swallowing, the complaints having been present for two months before admission. Physical examination showed increased tactile fremitus and a few rales over the right upper lobe and later a right sided wheeze was noted. Sedimentation rate was increased and leukocytosis was present. The chest x-ray showed a mass lesion in the right upper lobe. Bronchoscopy did not show an endobronchial lesion. Surgery on January 25, 1950 revealed an inoperable carcinoma of the right lung. Patient was transferred to another hospital for x-ray treatment where he died March 23, 1951. Post mortem examination showed an anaplastic bronchogenic carcinoma of the right upper lobe, with metastases to the chest wall and adrenals. No active pulmonary tuberculosis was noted.

CASE IV. J. B. This fifty-nine year old white male was admitted October 14, 1950 with an admitting diagnosis of asthma. Respiratory distress had been present since 1933 and was diagnosed as asthma. The respiratory difficulty did not become disabling until 1942; symptoms of respiratory insufficiency increased markedly from that time. Since 1946 he had had frequent respiratory infections, worse in the winter, and had lost forty pounds since 1948. He had been sent to Arizona from the Middle West in 1946 for climatic relief. His complaints on admission were wheezing, shortness of breath and productive cough without hemoptysis. Initial physical examination showed a markedly emaciated white male. A-P diameter of the chest was greatly increased and respiratory excursion was poor. The chest was hyperresonant and coarse rhonchi were heard bilaterally. Dyspnea was present at rest. X-ray of the chest showed extensive



CASE IV:
Fig. 4-a. Chest film on November 7, 1950 shows emphysema, old fibrous pleuritis and a nodular infiltration involving the right lower lobe.

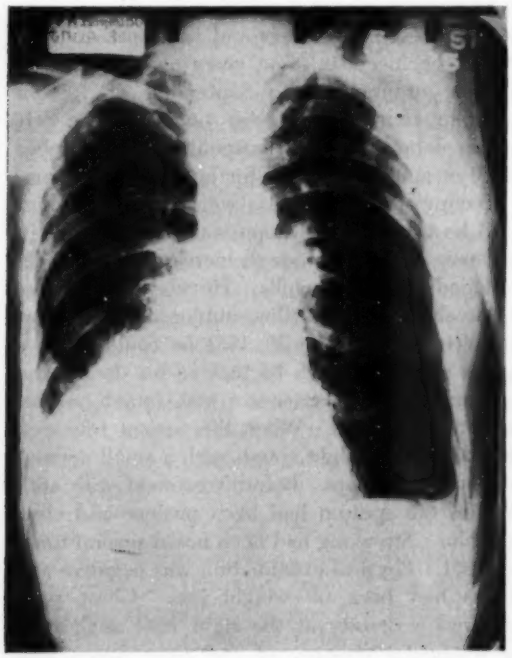
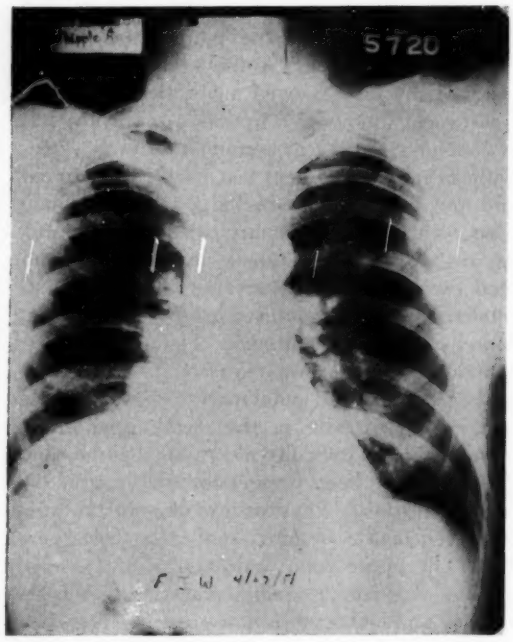


Fig. 4-b. May 23, 1951—The shadow in the right lower lobe is now dense and homogeneous and there is a suggestion of a pleural effusion.

fibrosis and emphysema with an inltration in the right lower lobe. The presence of fluid in the right pleural cavity was suggested by x-ray but attempts at aspiration yielded no fluid. The initial impression was pneumonitis, secondary to bronchiectasis, and later lipoid pneumonia and carcinoma were considered. Bronchoscopy showed no endobronchial lesion but pus was noted in the bronchi bilaterally. Bronchial aspirations and sputa were negative for tumor cells, acid fast bacilli and fungi. Serial x-ray films were quite suggestive of malignant disease but the severity of the patient's chronic pulmonary disease made surgery unfeasible. Terramycin kept the patient free of fever. When the antibiotic was stopped he would invariably develop fever again. Downhill course continued and the patient died June 3, 1951. Post mortem examination showed a carcinoma of the right lower lobe bronchus, 3.5 cm. from its origin, obstructing the lumen almost completely. Distal to the obstruction an abscess 5 cm. in diameter was noted, and bronchi distal to tumor were dilated and filled with pus. There was very extensive emphysema and moderate scattered bronchiectasis.



CASE V:
Fig. 5. Chest film on April 27, 1951 shows a round shadow 0.5 cm. in diameter in the 2nd left anterior interspace and a density at the right base, suggestive of a segmental collapse of the right lower lobe and the possibility of a small right pleural effusion.

CASE V. F. J. W. This fifty-one year old white male was seen April 27, 1951. He had had a cough for many years and had been told he had bronchiectasis some years ago. During a routine examination in September of 1950 a discrete round lesion was noted in the left upper lobe. He was hospitalized in October 1950 at another hospital for investigation. Bronchoscopy was negative as were sputum studies, and he was told the lesion was an old scar. In January of 1951 his cough increased and he developed fever and chills. He was treated successively with penicillin, aureomycin and terramycin. On March 30, 1951 he coughed up a piece of tissue which he took to his doctor and a squamous cell carcinoma was found on section of this tissue. When the patient was seen here he had a slight cough with a small amount of mucoid sputum. Before treatment with antibiotics the sputum had been profuse and clear in color. Streaking had been noted several times in 1951. Physical examination was negative and there had been no weight loss. Chest x-ray showed a density at the right base suggesting a segmental collapse of the right lower lobe and the possibility of a small right pleural effusion. A nodular density one-half cm. in diameter was noted in the left second interspace. The patient was transferred to the Veterans hospital at Long Beach, California, where on bronchoscopy tumor was found in the right lower lobe bronchus, and right pneumonectomy was done May 10, 1951. The excised lung showed in the lower lobe a squamous cell carcinoma and chronic bronchiectasis, with pneumonitis and small abscesses. Follow-up chest film on September 14, 1951 showed no change in the nodular lesion in the left upper lobe and the patient was in excellect physical condition.

SUMMARY

Much has been written recently of the increase in the incidence of carcinoma of the lung (1, 2, 4, 5). In a recent article, Poppe(1), reviewing a series of two hundred cases of pulmonary carcinoma in Portland, Oregon, in the past five years, found the incidence of carcinoma of the lung second only to malignancy of the G-I tract. Moyer and Ackerman(2, 3) report that carcinoma of the lung constitutes 6 to 10% of all carcinomas. Ochsner(4) found 86.4% of carcinoma of the lung in his series of four hundred twelve cases were in males, and 85% of the cases of carcinoma of the lung in Hollingsworth's(5)

series were in men. At this hospital in the past five years carcinoma of the lung has constituted 39% of the total number of carcinomas. The Whipple Veterans Hospital has an exclusively male patient population and a high percentage of the patients, whatever their admission complaints, have chronic pulmonary disease. Many veterans from all over the country with chronic pulmonary disease have either been sent or come of their own volition to the Southwest seeking climatic relief. These factors contribute to the disproportionate percentage of pulmonary neoplasms at this hospital.

Phillips and Morrison(6) cite a case of bronchogenic carcinoma masked by pulmonary tuberculosis. Numerous such cases have been reported and a figure of 1.5% has been given for the incidence of bronchogenic carcinoma in pulmonary tuberculosis. Moyer and Ackerman (2, 3) stated that bronchiectasis as a result of bronchial obstruction and secondary infection is seen in about 20% of the cases with bronchogenic carcinoma. Bronchiectasis may be so prominent that correct diagnosis is obscured if the primary tumor is not easily demonstrable. This, of course, holds true whether bronchiectasis is present before the occurrence of tumor, or, as more commonly occurs, is secondary to the tumor itself. Localized emphysema is another common finding secondary to the bronchial obstruction in carcinoma, and in the segments of the lung distal to the bronchial obstruction, atelectasis, abscess and pneumonitis are common. Secondary infection is frequent during the symptomatic phase of carcinoma of the lung, leading to misdiagnosis and misdirected treatment usually for recurring colds, chronic bronchitis and virus pneumonia(7, 2, 3). These complications, due to infection, are common in patients with chronic lung disease (fibrosis, emphysema, asthma and bronchiectasis) and occurrence of such symptoms should lead to consideration of the possibility of bronchial stenosis by carcinoma.

There are three points of interest in the consideration of bronchogenic carcinoma associated with chronic lung disease. These are the etiologic relationship, the diagnostic difficulties and the manner in which the pre-existent lung disease alters the therapeutic approach. This series of patients is too small to warrant any definite conclusions as to etiologic relationships. The concensus in numerous reports in the literature is that the relationship between tuberculosis and other chronic lung disease and bronchogenic carcinoma is coincidental. Approximately 50% of the patients in this series with carcinoma of the lung had chronic pulmonary disease. Despite the fact that approximately one-half the patients at the Whipple Veterans Hospital are being treated for tuberculosis, only one patient in this series had definitely active pulmonary tuberculosis. In chronic non-tuberculous lung disease, bronchogenic carcinoma supervened very commonly. This latter finding cannot be interpreted as showing any etiologic relationship between the chronic pulmonary disease and carcinoma of the lung since a large percentage of the patients entering this hospital have had pulmonary disease for many years.

The presence of significant chronic pulmonary disease had led in some cases to the masking of symptoms of carcinoma to a point that one cannot date the onset of symptoms due to the carcinoma. In most of the patients there was a definite change in type and severity of symptoms. Consideration of the possibility of carcinoma of the lung in these patients with the appropriate diagnostic studies should lead to the correct diagnosis. The patients themselves may not be concerned by new pulmonary symptoms after years of coughing and chest pain, and in some of the patients there was an unduly long delay before relief was sought. The percentage of patients in the present series with resectable lesions (21%) is about the average in pulmonary carcinoma although some authorities report the percentage of patients with carcinoma of the lung coming to resection as high as 40%(1, 2, 8). The percentage of the patients suitable for resection in this series was lowered by the presence of those patients whose non-malignant lung disease had lowered the respiratory reserve to a point where surgery could not be considered. It may be seen then that the presence of a pre-existing pulmonary disease is another factor adding to the difficulties in diagnosis of bronchogenic carcinoma and the application of curative surgery.

CONCLUSIONS

1. In a series of twenty-eight patients with carcinoma of the lung seen at the Whipple Veterans Hospital in the past five years, thirteen had pre-existing chronic pulmonary disease.

2. The existence of chronic pulmonary disease adds to the difficulty of early diagnosis and

may limit surgical attack by the limitation of respiratory reserve.

3. In view of the frequent occurrence of carcinoma of the lung in patients with chronic pulmonary disease, the diagnosis of bronchogenic carcinoma should be kept in mind in the presence of a change in symptoms and questionable x-ray findings.

4. Five case reports are presented illustrating some of the problems discussed.

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NEWER TRENDS IN OPHTHALMOLOGY

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Probably nowhere in the human body is there an area which may be so readily examined by simple or complex apparatus than the human eye. It may be seen by the naked eye, by high external magnification, by internal examination of several kinds, by transillumation, and binocular viewing methods. It can be palpated, turned, and compressed. It's blood supply can be seen, many of its sensory and motor neurologic sensoria can be reviewed by objective and subjective tests.

Because of these and other peculiarities of the human eye, the average ophthalmologists office looks like a machine shop. With this complex machinery it is often possible to learn much about an eye and its disease. In spite of all these advantages, there are exasperating problems. Those outside this specialty are required for help—sometimes the assistance of a number of physicians and laboratories.

In recent years there has been a steady progress, towards specificity in diagnosis and treatment. So many have been these advances that review of them all is impossible here.

Until recent years ophthalmic medical armamentarium was quite limited. There were few specific curatives, and not too many reliable diagnostic tests. Now innumerable investigative technics as well as medicines are useful. No longer is a casual look at a conjunctivitis proper before applying silver nitrate. It is not sufficient to dilate the pupil and use milk injections and salicylates in iritis. More than excision of the prolapsed iris is needed and there is treatment for dense corneal scars.

Read before Regular Meeting Maricopa County Medical Society, Good Samaritan Hospital, Phoenix, Arizona, Mar. 26, 1951.

The other extreme of using the new medicaments like penicillin routinely is equally improper. Nor should there be neglect of some of the older emperic treatments. Long after apparently successful newer procedures have been proved useless, the older ones may still prove to be helpful.

Some examples of specificity in treatment will illustrate the above points:—

A premature infant was seen about six hours after birth. The baby's eyes exhibited an unusual amount of secretion. Because of the peculiar greenish appearance of the secretion, it seemed that it might be pyocyaneous infection. After taking a smear and culture aureomycin ointment was ordered. The preliminary culture reported no organisms and the smear showed only pus cells. The secretion diminished but was present in reduced amount until the tenth day when the culture was reported to be gonococcus, penicillin sensitive. Penicillin immediately cleared it. Then why not use penicillin routinely? Another patient will show why. A baby had a serosanguinous eye secretion almost from birth. A streptococcus infection was suspected, penicillin ordered. A staphylococcus, penicillin resistant but sulfa sensitive culture was obtained. It cleared quickly on sodium sulfacetamide.

A man had recurrent blepharitis and conjunctivitis for years—he had used a dozen different emperically prescribed ointments and drops. A conjunctival culture was taken and terramycin ointment prescribed. The culture grew streptococcus and staphylococcus which were very sensitive to chloromycetin but insensitive to terramycin, penicillin, streptomycin

and sulfanilamides. After a change to chloromycetin drops the infection cleared and has not recurred.

A similar infection in an elderly lady proved to be a dacryocystitis caused by micrococcus tetragenous which also was sensitive only to chloromycetin.

A patient with a recurrent iritis which did not respond to ordinary office procedure was hospitalized and brucellosis was discovered. Both iritis and brucellosis improved rapidly under chloromycetin therapy. A luetic iritis in a diabetc was cleared quickly after initiating penicillin treatment when the Wasserman was found to be positive. A tuberculous iritis which was thought to be non granulomatous because of its slit lamp appearance was probably tuberculous as the patient had active tuberculosis. His iritis improved materially under streptomycin and P.A.S. (para amino salicylic acid) therapy

These few cases demonstrate that one cannot be too thorough in ones care of these patients.

Trauma to the eye has always necessitated individuality of care and must be specific in various ways. X-ray pictures frequently show unsuspected specific damage, foreign bodies or infections and should always be made in an injured eye. An army sergeant who had been subjected to mortar explosion was being treated for loss of hearing. Routine eye examination showed vitreous opacities and an x-ray revealed a tiny intraocular foreign body which was rather easily removed. Another soldier became dizzy upon bending forward. He reported for eye examination which demonstrated a homonymous scotoma. X-ray of his skull showed a tiny metallic intracranial shell fragment. A field test was a specific aid to diagnosis.

Lacerations of the lids and eyes may be better repaired because of newer knowledge and instruments. Lid defects may be prevented by careful approximation with fine sutures. Epiphora can be eliminated with soft wire or other suture through a torn canciliculus. Lacerations of the cornea may be well repaired with new sutures and forceps. Prolapsed iris tissue can be replaced within the eye safely, thus avoiding loss of vision and deformed pupils. In seventeen such injuries in the past few years, ten have had no damage to the lens and each of these have better than 20/30 vision and round or almost round pupils. The other seven had badly damaged eyes and though the pupils were round, cataracts or other complications developed so that only two have useful vision. Three of the iris prolapses had been present for more than 20 hours before they were replaced into the eye. This would have been virtually impossible before antibiotics and cortisone and similar new agents plus specific instruments and technics.

Burns about the eyes may be healed better now with newer understanding of tissue healing. The stimulating effect of the sulphydrylradical such as found in hydro-sulfasol improves the end results in these works.

More rapid healing can be obtained in injuries, ulcers and abrasions with plasma–thrombin drops. Intractable cases of this nature have healed in a day or two after starting this new tissue glue which replaces lost cement substance destroyed or delayed in its formation by such things as lysosyme or bactorial action.

Late effects of trauma such as corneal scars may be replaced by corneal transplants which are now easy to perform because of the careful precise work of a few ophthalmic researchers.

Corneal ulcers respond to specific antibiotics if cultures and antibiotic sensitivity tests are performed. Scrapings and special tissue stains reveal other than bacteral infections such as trachoma which now clears with sulfa therapy.

Anterior segment inflammations will often be aided by specific medicaments using iontophoresis for rapid ion transfer and penetration.

Corneal vascularization virtually disappears with beta irradiation so that vision may clear remarkably with new apparatus using atomic energy by-products such as strontium 90.

Corneal physiology is better understood because of the fine work of Cogan and Kinsey with the result that it is known that the corneal stroma maintains its water balance by a simple method of osmosis with the ephithelum and endothelium acting as impermeable membranes. The anterior chamber and the aqueous humor are slightly hypertonic and the fluid constantly passes from the limbal vessels into the stroma and then out. Disturbances in this fluid balance may permit bullae to form on the surfaces of the cornea, markedly diminishing vision. Johnson in Cleveland has had remarkable improvement in these cases by eliminating the tears through section of the greater superficial petrosal nerve. A limited number of personal patients who have undergone this operation have

had some improvement of vision in badly disturbed eyes, and certainly have lost their bullae and had marked drying effect. The neurosurgeon has been able to help in a delicate, specific fashion at times. The other amazing things the neurosurgeon does to prevent blindness and aid ophthalmic conditions is a large subject.

Vitamins have been shown to aid in corneal nutrition, especially vitamins B and C. Iontopharesis has been advocated to incraese the locai concentration of these elements, but it is likely that they must be first phosphorylated by a complex chemical process so the vitamins should be given parenteral injection or orally. Conjunctival conditions must be investigated in a fashion similar to corneal inflammations. In infections, smears and cultures should be made, and antibiotic sensitivity tests made. A brief analysis of 50 office cultures shows a variety of organisms responsible for some of the prolonged infections. About 25% of the cultures showed no growth. Staphylococcus, streptococcus, mixed staphylococcus and streptococcus, and micrococcus tetragenous were the most frequent organisms found. Chloromycetin and terramycin were by far the most useful treatments both by in vitro and in vivo trials, and the use of these new antibiotics hastened the curing of stubborn cases.

Conjunctional tumors are deceptive and should be removed as well as possible at biopsy, for it is impossible to differentiate them clinically. Many of both benign and malignant nature will respond to early beta irradiation. If neglected, a disfigurating exenteration of the orbit may become necessary to save life. Radium and x-ray must be used cautiously near the eye, as about 400 roentgens can produce a cataract. The Uveal tract also permits specificity in both diagnosis and treatment of its many and frequent dangerous afflictions. Woods at Johns Hopkins by clinical and experimental work simplified the designations of uveal disease. He divided most cases of uveal inflammations into two types—granulomatous and non granulomatous. These may often be differentiated clinically. Granulomatous lesions are caused by the lodging in the tissues of granuloma producing living organisms, such as tubercle bacilli, treponema pallida and the like. Non-granulomatous lesions are caused by a sensitization of the tissues by a previous exposure to a circulating toxin or bacterial product from a distant focus, with later exposure causing an acute exudative process. By careful examination the cause can be suspected and an investigation made to find the denite cause. The most common foci are probably teeth, tonsils, sinuses, genito urinary tract and gynecologic infections. Here the ophtholmologist must again direct the investigation.

Therapy must be guided by the results of the tests and special examinations. Penicillin in lues, streptomycin plus para amino salicylic acid (P.A.S.) in Tb, chloromyetin in brucellosis have been helpful in granulomatous uveitis, while antihistiminics, the various antibiotics, artificial fever therapies, and hormones assist the control of non granulomatous ones.

The older and still useful salicylates, iodides, milk injections must not be forgotten.

It is in uveal disease that ACTH and cortisone do their best work in ophthalmic usage. They combat the allergic elements and frequently eliminate the destructive phase, thereby preventing loss of vision. Spectacular results may occur with their use. These hormones sometimes fail to aid and can be dangerous, so their use is best directed by one familiar with their actions, such as the internist or family doctor.

Newer specific agents such as hyaluronidase, by its spreading effect assists local anaesthesia, and is especially useful in acute glaucoma where it may help bring down high tension to normal in a few minutes. (D.F.P.) diisopryl-fluorophoshate, is a new miotic which need only be instilled once in 24 to 48 hours, and is a valuable aid in helping to control chronic glaucoma. The visual field and other tests must of course guide ones treatment of this dangerous eye disease.

The field of ophthalmology is replete with the new and the specific in management of its many problems. All of them cannot be named here. Some are:

The newer oblique muscle surgery, corneal surgery, new cataract technics, new prosthotic ocular appliances and implants, improved plastic surgery methods, new optical lenses of plastic and hardened glass, contact lenses. Progress in every field of medicine is going forward. The research clinics are daily discovering newer methods and specificity remains the keynote of this progress.

SECTION ON MEDICAL RESEARCH

ARGINASE AS IN ANTI-CARCINOGENIC AGENT IN MICE AND HUMAN BEINGS

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INTRODUCTION

Many significant relationships between arginase and the fundamental processes of life, (i.e.: regeneration and repair, growth and reproduction,) were observed by the author from research work undertaken in 1939 involving a study of these processes in lower animal phyla, where the potential of regeneration often approaches that of reproduction (40, 41, 49).

These observations, together with a review of the literature on the relationships of the amino acids to tumors, have led to investigations of arginine and its specific enzyme, arginase (27) and their physiological roles in the mammalian body, with special reference to tumor formation and growth. The results of these investigations form the basis of this paper.

Protoplasm: Proteins and Amino Acids

In such a study one must consider the importance of the chemistry of protein, as it is the basic constituent of protoplasm. In oncology the chemistry of protein must be considered both in normal and abnormal phases due to the fact that the point where normal processes end and neoplasia begins is often masked by the inflammatory reaction—the response of living tissues to irritation (12).

Arginine (alpha-amino-delta-guanidine-valeric acid) is a diamino-mono-carboxylic compound. It was first identified by Schulze and Steiger (29) in 1886. In the plant kingdom arginine is found abundantly in legumes, Brazil nuts, squash seeds, and almonds (50). In animal tissue it occurs in large quantities in the protamine of sperm and the tissues of thymus gland (24, 53, 55, 56).

Arginine and Its Metabolism In Mammals

In spite of extensive investigations on the subject, very little has been learned about the metabolism of arginase (26, 52). Arginase is the specific enzyme of arginine (27). It has not been found in lower animal phyla (40, 41), but is peculiar to mammalian physiology where the potential of regeneration is lowest in comparison to other animal phyla (40, 49). The amount of arginase produced by the liver has been shown to be directly influenced by the pituitary hormones, particularly the adrenocorticotropic hormone (ACTH) (17, 18). In the mammalian liver the hydrolysis of arginine to urea and ornithine is catalyzed by arginase (6, 8, 23, 34). The exact role of arginine in the formation of these two glucogenic substances (70) is not very well understood (11, 35). Recent studies have related arginine to the synthesis of creatine (7, 9, 10, 57). This research indicates that the amidine porton of the creatine molecule was derived from a similar portion of the arginine molecule (30, 32, 38, 57). In the muscle of certain species of lower animals phospho-arginine serves in a capacity similar to phosphocreatine (2, 3, 33, 51, 54, 64).

Arginine and its Importance to the Fundamental Processes of Life

The importance of arginine to the processes of life is indicated by the fact that it is present in varying concentrations in every protein reported to date (28, 52, 55, 56). Since it is abundant wherever reproductive and regenerative processes occur, its presence in the organism is considered by some to be a prerequisite for the occurrence of these processes (19). It has been shown that potentials of regeneration and repair occurring in the animal phyla vary inversely from the lowest to the highest (49). In the lower phyla, where regeneration often approaches the potential of reproduction, arginine, in free and combined forms, is found in large quantities (2, 3, 14, 15, 16).

Arginine is also thought to be responsible for the maintenance of normal growth rate in an organism (60, 65). It can be synthesized by most animal bodies (68) in quantities sufficient for slow growth, but, according to Rose (67, 68), not in sufficient quantity to maintain a normal growth rate (13, 60, 65, 66). When deprived of an arginine diet, the chick, which is incapable of synthesizing arginine (31), was unable to maintain normal growth, but when combinations of

EDITORS NOTE: This treatise has been accepted for publication in recognition of what appears to be an arduous piece of research. We are informed by the authors that this experimental study has begun on human beings.

this amino acid were added to its diet, growth was stimulated immediately (31, 62).

Since protamine, the simpler polypeptide found in sperm, is composed of 87.4% arginine (24, 53), a definite relationship is established between arginine and the process of reproduction. In the event of arginine deficiency, the arginine of the protamine of sperm may be diverted to use by other tissues. Even though the normal body requirements for the adult human male are 4.7 grams per day, (6), they are able to maintain a nitrogen balance on an arginine-deficient diet, but spermatogenesis is seriously impaired (61).

Recent observations of the reactions of those amino acids active in transamination—especially arginine—point to the additonal importance of this latter substance in the organism for maintenance of metabolism in protoplasm (36, 59, 72).

Arginine and Its Relation To Tumorous Growths

It has been observed that the arginine content of tumors may be twice that of normal tissues (47). The feeding of arginine to tumorous mice was found to promote tumor growth (20, 71), and to increase the number of "takes" in tumor implant (21). Similarly, its effect on isolated tissue cultures was to produce or stimulate mitotic cell division (42, 43, 4). An increase in the amount of free arginine was found to occur also in the tissues of both Rous and Jensen sarcoma, as well as in other types of tumors of mice, rats, and fowl (1, 45). An activity curve was produced when arginine and thyroxin was fed rats with tumor implants. It was found that arginine produced twice the stimulative effect that was observed when thyroxin alone was administered, and a combination of both substances produced three times the activating effect of thyroxin (22).

EXPERIMENTAL PROCEDURE.

1. *Tissue Cultures and Animal Implantations*

From results obtained in preliminary experiments upon tissue cultures, it was found that growth of cell colonies was stimulated in guinea-pig connective tissue cells. An increased number of cells of the mitotic variety appeared when arginine was incorporated in various forms in the culture media. Even direct introduction of virile guinea-pig sperm into the media resulted in an increased mitotic activity not evident in those cultures whose media were normal or contained thyroxin.

Subcutaneous and intraperitoneal implantation of these arginine-treated tissues in mice resulted in many "takes" which, histologically, resembled malignant neoplasms (42, 43).

2. *Effect of Arginase on the weight physiology of the Mouse*

To observe the elementary effect of arginase upon the weight physiology of the mouse, 20 Hamilton-strain white mice were used for controls and 20 others received subcutaneous and intraperitoneal injections of arginase solutions of various concentrations. The arginase used was prepared from fresh beef liver. The weight curve obtained indicated that the effect of the enzyme was directly proportional to the quantity of arginase units injected. Without exception, a lesion developed at the injection site, the size of which was directly proportional to the concentration and quantity of the enzyme (42).

This same experiment was repeated on C3H cancer-strain mice. Similar results were obtained, and it was observed that there was a measurable differential between the weight curves of the two groups. The difference indicated that there was a greater ratio of free arginine in the C3H cancer-strain mice than in the normal Hamilton-strain mice because a greater amount of arginase was required to produce similar results (44).

3. *Adenoid Mammary Tumor Occurrence Inversely Proportional to Units of Boby Arginase*

For over 6 months the records of a colony of 40,000 normal white Swiss mice were checked and it was noted that the rate of females to males developing adenoid mammary carcinomata was over 1000 to 1. In view of this, an equal number of male and female mice without tumor were sacrificed, weighed, skinned and eviscerated. The carcasses of each sex group were tested for tissue arginase. It was found that the males averaged 227.5 arginase units (63) per gram of body weight while the females averaged 93.5 arginase units per gram of body weight. These data were interesting because of their correlation with the tumor incidence in the different sexes, which thereby indicated a possible relationship between the arginine-arginase ratio and the occurrence of tumors.

4. *Effect of Arginase on Growth and Histology of Spontaneous Tumors*

The next experiment involved a study of the effect of arginase on the growth and histology of the constantly-occurring spontaneous tumors

(5, 25) in the colony observed. Observations recorded were macroscopic changes in size and appearance of the tumors and the host, histological changes in the tumors, and whether or not the animals died of their tumors after treatment. The mortality from spontaneous carcinoma, untreated in these mice, was 100%.

It was established that these tumors were mammary carcinomata. Macroscopically they occurred as large, soft, lobular masses in the mammary line on either side of the body from the cervical-axillary region to the groin. The lymphatic tissues in the region of the tumors were distended by swelling. Microscopically, they exhibited without exception, a cord-like arrangement of rapidly dividing cells (indicated by many mitotic configurations), a state of high vascularity, an absence of fibrosis, and a granular cytoplasm with definite, well-delineated cell walls. The cells were multinucleate with many nucleoli eccentrically placed. Staining techniques revealed no evidence of mineral deposition.

Amounts of arginase solutions varying from 5 to 250 arginase units per cc were administered by intraperitoneal injections to different groups of tumor-bearing cancer-strain mice. Some mice received only one injection while others received repeated doses at regular intervals.

It was found that noticeable results were obtained with injections as low as 9 arginase units, while the maximum tolerance level of the animals was established at 1200, given in dosages of not more than 240 arginase units every 24 hours. Except for those animals receiving dosages well above the maximum tolerance level, none of the injected animals died of their tumors. The large measurable tumors were permanently reduced in size from 30% to 70% while the smaller tumors visible before injection could be detected only by palpation. The tumors of the treated mice were palpably firm and the lymphatic tissues near them had been reduced to normal.

Dissection of these tumors revealed them to be highly avascular, granular, and gritty with mineral deposits. Differential staining methods (von Kossa) for calcium were positive.

A. *Calcium Deposition Proportional to A. U. Administered*

Observations in the above experiment indicated that, possibly, there might be a relation between the amount of arginase units administered and the amount of calcium deposition. Consequently, one animal was selected and given an arginase concentrate in three daily injections, the total arginase units exceeding the maximum tolerance of 1200. Five days later when the tumor was removed, decalcification was necessary before this mass could be sectioned for microscopic examination. This deposition of calcium in treated tumors is significant in that it has been reported that malignant tissue is singularly devoid of calcium (48).

B. *Direct Injection of Arginase into tumors*

Since it has been suggested that the ornithine formed by arginine metabolism destroys the catalytic action of arginase (37), it was decided to inject a controlled amount of the enzyme directly into a large tumor to study the effect of the buffering action of ornithine that might be thus formed. The tumor selected was a large spontaneous mammary carcinoma extending from the axillary region down the foreleg to the foot of the animal, and 9 arginase units were injected directly into the medial half of the tumor.

The results were similar to those obtained by intraperitoneal administration of arginase. Within three days the tumor, which at time of injection was quite uniform in shape, had become gourd-like, with the smallest pole located proximally. Histological examination showed the distal portion to be typically malignant, while the proximal half presented a picture of innocence.

5. *Effect of Arginase on Growth and Histology of Mammary Carcinoma Implants in C3H Cancer-strain Mice*

The results obtained from this experiment were to be compared with those of Experiment 4.

30 C3H cancer-strain mice received mammary carcinoma implants in the flank. 11 days later, when the tumors had become well established, the animals were separated at random into three groups of 10 each, and the groups were separately designated "A", "B", and "C". Group "A" was used as the control. Group "B" received daily intraperitoneal injections of 1cc of arginine solution, which contained 0.16 M of arginine monohydrochloride in 0.1 M phosphate buffer solution at pH 7.5 Group "C" received daily intraperitoneal injections of 1cc (60 arginase units) arginase solution, which had been obtained from extract of beef liver and activated

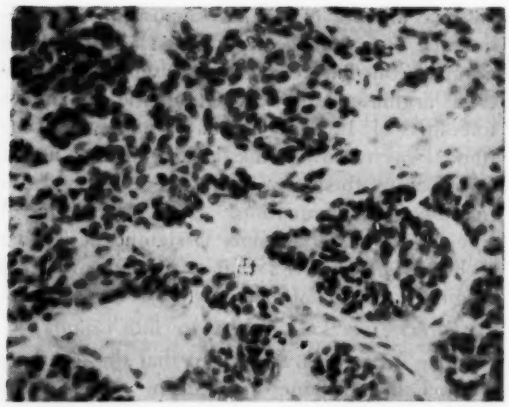

Figure 1. Malignant phase. Section of Spontaneous Adenocarcinoma before intraperitoneal injection of Arginase (x450). W. G. Irons.

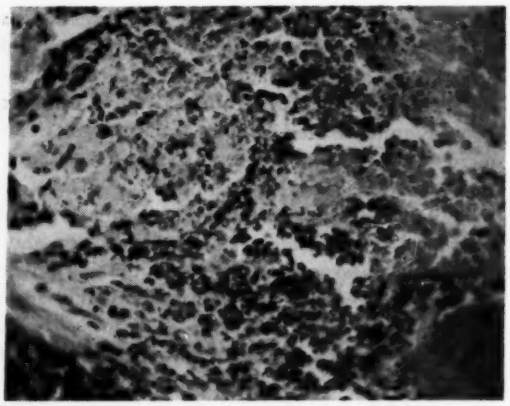

Figure 2. Innocent Phase. Section of Spontaneous Adenocarcinoma ten days after receiving intraperitoneal injections of arginase. (x450). W. G. Irons.

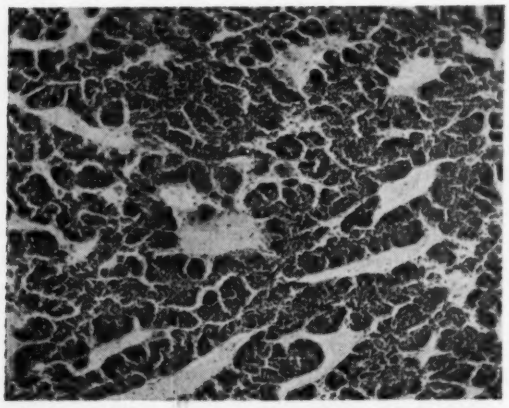

Figure 3. Malignant Phase. Section of Mammary Adenocarcinoma implant before intraperitoneal injections of arginase exhibiting the typical glandular arrangement of tumor cells (x80). W. G. Irons.

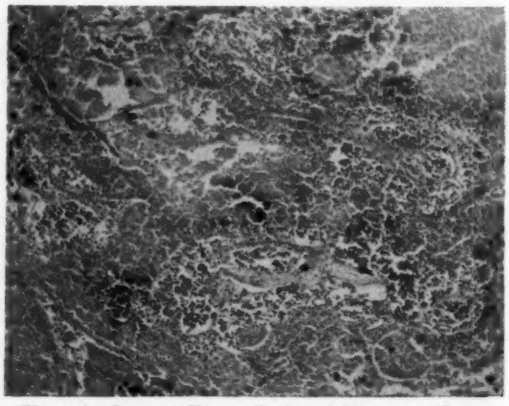

Figure 4. Innocent Phase. Section of Mammary Adenocarcinoma after daily intraperitoneal injections of one cc. of arginase solution containing 60 A.U. for ten days (x80). The treated animals did not die of their tumors as did those of the control groups. W. G. Irons.

by 1.25 mg of cobaltous ion per cc of extract for 3 hours at 40°C.

The experiment was continued until the last mouse of both the control groups ("A" and "B") had died of tumor 21 days after implantation, thus the injections extended over a period of ten days. At the end of this period all 10 of the mice receiving arginase ("C") were alive and active. Although injections were discontinued in this group at this time, daily measurements of the tumors were continued for an additional 10 days, at which time the mice were sacrificed for histological observations. During this period the growths did not increase in size and the animals appeared to be healthy.

During the 10-day experiment each animal of the three groups was weighed daily and its tumor measured with calipers. The following table was compiled from the averages of each group obtained over the 10 day injection period.

In Experiment 4, the tumors of the mice not receiving arginase (Groups "A" and "B") exhibited a high state of malignancy (see Fig. 3), while those receiving arginase were innocent (see Fig. 4).

In the animals of Group 'C" a 28% over-all reduction in the size of the tumors was observed, while the ratio of tumor length to tumor weight was 26% lower than in Group A. In the arginine recipients (Group "B") the ratio of tumor length to tumor weight was increased 7.9%.

The tumors of the arginase recipients were encapsulated, definitely enough to be neatly separated from the surrounding tissue, and sectioned. Extensive fibrosis gave an appearance of disorganization to the tumor cells and the cytoplasm was clear and syncytial in nature. The cell nuclei appeared larger and paler, and ex-

Group	Average Body Wt. On day indicated		Tumor Length on day indicated		Tumor Wt. at Post	Tumor Growth from day of implant	% Growth Compared to "A"	Ratio Tumor L/W in %
	"0"	"10"	"0"	"10"				
"A"	29.5	35.0	15.2	37.1	6.4	37.1	100%	100%
"B"	32.6	34.8	21.7	38.8	6.2	38.8	104.5	107.9
"C"	31.4	34.8	18.8	26.7	6.1	26.7	72.0	74.1

(L) – Length expressed in mm. (Growth refers to length increased in mm.).
(W) – Weight expressed in grams
Group A – Controls
Group B–Arginine Recipients
Group C – Arginase Recipients

hibited a single nucleolus, centrally located. The tumors demonstrated increased amounts of connective tissue, areas resembling embryonic-type mesenchymal tissue, and large areas of necrosis without liquefaction. Differential staining techniques showed these areas to be filled with heavy desposits of calcium.

SUMMARY

As might be expected from the tremendous amount of research on relationships between amino acids and the fundamental processes of life, interpretations are quite controversial (35, 69). However, arginine is known to be present in every protein and has been found to be of considerable importance to these basic processes of life, since in its absence either these processes do not occur at all or are seriously impaired. The most significant relationships that are generally agreed upon to exist between arginine and tumor formation appear to be:

1) the presence of large amounts of arginine and the absence of arginase in lower animals with multipotent regenerative powers (2, 3, 14, 15, 16, 39, 40, 41, 46, 49, 54, 64);
2) the high arginine content (87.4%) of the spermic protamines and the accompanying totipotency of the receptive ovum (24, 43, 42, 58, 61);
3) the arginine content of tumors may be twice that of normal tissue (47);
4) the introduction of arginine into the body of the animal is found to promote tumorous growth (20, 71).

Therefore, in view of these relationships, investigation was instigated of the effects of arginine and its enzyme, arginase on tumor formation and growth.

From experiments involving the intraperitoneal injection of arginase solution into both cancer-bearing C_3H and white Swiss mice, it was found that, contrasted to the characteristics typical of highly maligant tumors in the controls, the tumors from the animals treated with arginase, besides preventing death from tumors, demonstrated without exception the following salient characteristics:

1) A 28% reduction in general tumor growth, and a decrease of 26% in the ratio of tumor length to tumor weight.
2) An encapsulation definite enough to permit their neat separation from the tissues of the animal without incidence and to permit sectioning of the exfoliated capsule.
3) Fibrosis extensive enough to give an appearance of disorganization to the tumor cells.
4) A clear and syncytial cytoplasm throughout the entire area of the tumor.
5) Benign fibro-adenoma, with increased amounts of connective tissue, and large areas of necrosis without liquefaction.
6) Large, pale nuclei with single, centrally-placed nucleolus.
7) Heavy calcium deposition through the tumor mass.

Arginase solution directly injected into the tumor mass was found to produce effects indentical with that administered intraperitoneally.

For a visible comparison between the histology of the innocent phase exhibited by the tumors from the treated mice, and the malignant phase exhibited by those from the controls, see Figures 1 and 2; 3 and 4.

Autonomy is the cardinal property of both the fertilized ovum and the malignant cell, however, the fertilized ovum is totipotent while the

malignant cell is unipotent, except in the case of cells of mesodermal origin in which there is an inherent multipotency.

It might be concluded that the presence of the amino-acid arginine as nucleo-protein is responsible for the process of autonomous growth.

Biological Abstracts
ARGININE-ARGINASE SYNDROME AND MALIGNANCY

In view of the observations that (1) large amounts of arginine are present in lower organisms with multipotent regenerative powers while no arginase has been found, (2) the protamines contain large amounts of arginine which, after fertilization, results in totipotent ova, and (3) the arginine content of tumorous tissue may be twice that of normal tissue, experimentation was instigated on the effects of arginine and its specific enzvme, arginase, on tumor formation and growth. These experiments involved the intraperitoneal injection of arginase solution into both cancer-bearing C_3H and white Swiss mice. It was found that, contrasted to the characteristics typical of highly malignant tumors which caused the death of the controls within 11 days, the tumors from the surviving animals—those treated with arginase solution—demonstrated without exception (1) a 28% reduction in general tumor growth, and a decrease of 26% in the ratio of tumor length to tumor weight, (2) an encapsulated definite enough to permit their neat separation from the tissues of the animal without incidence and to permit sectioning of the capsule, (3) extensive fibrosis, which gave an appearance of disorganization to the tumor cells, (4) a clear and syncytial cytoplasm throughout the entire area of the tumor, (5) benign fibro-adenoma, with increased amounts of connective tissue, small areas of embryonic-type mesenchymal tissue, and large areas of necrosis without liquefaction, (6) large, pale nuclei with single, centrally-placed nucleolus, and (7) heavy calcium desposition throughout the tumor mass. Arginase solution directly injected into the tumor mass was found to produce effects indentical with that administered intraperitoneally.

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PHOENIX *Clinical* CLUB

MASSACHUSETTS GENERAL HOSPITAL CASE NO. 29132

The Case History in this discussion is selected from the Case Records of the Massachusetts General Hospital, and reprinted from the New England Journal of Medicine. The discussant under Differential Diagnosis is a member of the staff of the Massachusetts General Hospital. The other discussants are members of the Phoenix Clinical Club.

A twenty-seven-year-old married dentist was referred to the hospital because of fever and a persistent nonproductive cough of six weeks' duration.

The patient had always been in excellent health until three months before admission when during the summer, without known precipitation factors, he experienced a sharp pain that began in the right shoulder but soon settled in the anterior right chest. This was made worse by deep respirations and movements of the trunk. Six weeks before admission he suddenly developed a nonproductive irritating cough but did not have an upper respiratory infection. This continued to the day of admission without any change in severity and did not respond to cough medicine prescribed by his physician. Two weeks before entry the physician found that the patient's temperature was 100.2°F., the pulse 120, and the respirations 30. Chest films at another Boston hospital were said to have revealed "a mass in the right lung that was cystic and contained fluids". During the week prior to admission he had a daily temperature elevation to 101°F. and drenching night sweats. There was no hemoptysis, weight loss, palpitation, dyspnea, chills or cyanosis.

The family history was noncontributory. The patient was born in Boston and had lived there most of his life.

Physical examination disclosed a well-developed and well-nourished man in no apparent distress. The trachea was in the midline; the chest seemed symmetrical, but there was some lag in expansion on the right. There were dullness and diminished breath sounds on the right side to the level of the eighth rib posteriorly and the clavicle anteriorly. Scattered crackling rales and bronchovesicular breathing were audible in the midcapular region. Examination of the left lung, heart and abdomen was normal. There was minimal clubbing of the fingers.

The blood pressure was 130 systolic, 82 diastolic. The temperature was 98.6°F., the pulse 120, and the respirations 35 The pulse and respirations remained rapid throughout hospitalization. The temperature rose to 100.4°F., but did not rise in abrupt sharp peaks.

The hemoglobin was 12 gm. per 100 c.c., and the white-cell count 16,900. The urine was acid in reaction and had a specific gravity of 1.020; the sediment contained rare red and white cells. The blood Hinton test was negative.

A chest roentgenogram disclosed a 12 by 15 cm. smooth, homogeneous mass that filled the anterior two thirds of the lower right chest and rose to the level of the second rib anteriorly. The mass appeared to arise from the anterior mediastinum on the right side. The right main bronchus and its subdivisions were not grossly abnormal. There was a small amount of fluid in the right pleural space. The left lung field was clear; the heart was not definitely abnormal and the left diaphragmatic shadow appeared normal. There was no evidence of mediastinal shift or of esophageal displacement.

An operation was performed on the ninth hospital day.

DR. ROBERT S. FLINN:

This 27 year old dentist entered the hospital because of nonproductive cough of 6 weeks duration. Three months before admission he had pain in the right chest. Six weeks before admission he developed a nonproductive irritating cough which did not follow an upper respiratory infection. His temperature rose to 101; there was no blood spitting; weight loss; palpitation; dyspnea; chills nor cyanosis. X-ray of the chest showed a smooth homogeneous mass that filled the anterior two-thirds of the lower right chest and rose to the level of the second

rib anteriorly. This mass appeared to arise from the anterior mediastinum on the right side. The right main stem bronchus and subdivisions were not grossly abnormal. The left lung field was clear.

Gray, Shepard and Dockerty say that: "The division of the mediastinal space into three compartments is a delineation which serves more than its originally pure antomic purpose. Tumors arising in each of these spaces bear certain marks of distinction which permit of their general classification according to the situation. Thus the anteror mediastinum is the site of election for dermoid and thymoma. The middle mediastinum is the site of bronchogenic carcinoma and lymphosarcoma. From the structures of the posterior mediastinum arise lymphosarcoma and neoplasms such as neurofibroma and ganglioneuroma whose origin may broadly be considered under the term 'neurogenic'". To this list we can add to the anterior mediastinum thyroid cyst, aneurysm, sarcoma and metastatic carcinoma and to the list of the posterior mediastinum lesions lymphosarcoma, aneurysm, lipoma and metastatic carcinoma.

If we accept the x-ray interpretation on its face value, namely, that this mass arose from the anterior mediastinum, we can at once dismiss such malignant and benign lesions of the lung such as bronchogenic carcinoma, mixed tumor, sarcoma and fibrosarcoma and benign adenomatous bronchial tumors. Indeed, since this tumor mass arose from the mediastinum, we can dismiss everything except tumors and cysts of the mediastinum.

It is proper to discuss mediastinum tumors and cysts as a group, even though they comprise a large number of lesions that are pathologically unrelated. Significant is the fact that few of the reported cases have been observed in the later decades of life. This would seem to indicate that these lesions, untreated, are generally incompatible with longevity. Since there tends to be great similarity in the clinical manifestations of all of these tumors, one is concerned primarily with differentiating the benign and malignant lesions for which surgery offers some prospect of cure from those for whch it is definitely out of the question.

The first symptoms and signs of mediastinal tumors and cysts are generally attributable to the fact that they displace and compress adjoining structures. Growth is frequently very slow, permitting gradual adjustment to pressure changes. A patient who has harbored a mediastinal neoplasm from birth is often entirely unaware of changes due to pressure until he has reached the third or fourth decade of life, when the growth may have attained tremendous size. An expanding mass in the mediastinum will, in the course of time, manifest itself by producing a sense of fullness or tightness in the chest and eventually pain. The pain may be dull or sharp, localized or widely referred. Pressure on the trachea or bronchi will give rise to a dry, irritative cough. Wheezing may appear as the airway becomes narrowed, and increasing shortness of breath may be noticed. Dyspnea is a common early symptom and sometime seems to be out of proportion to the size of the mass. Erosion into bronchus or lung may cause hemoptysis or even severe hemorrhage. Cysts rupturing into a bronchus will discharge their contents and are then likely to become secondarily infected. Occasionally infection occurring within a cyst, even without the presence of a bronchial communication, will give rise to the first symptoms of the condition.

Among the most interesting lesions of the mediastinum are those resulting form developmental aberrations, particularly the teratodermoid group of tumors and cysts. These are derived from the ectoderm and sometimes include elements of mesodermal and endodermal derivation.

The vast majority of intrathoracic teratodermoid tumors originate in the anterior mediastinum, directly behind the sternum and in front of the pericardium and great vessels. Rarely they are found in other locations. X-ray evidence of calcification within the wall of a teratodermoid cyst is frequent, while tooth and bone formation with a mediastinal tumor is diagnostically specific. Air and a flud level may be demonstrated within such a cyst which has ruptured into a bronchus. Since their growth tends to be very slow, unless infection or malignant degeneration supervenes, pressure symptoms generally do not become evident until the second, third, or fourth decade of life. Unless removed, these tumors nearly always cause death before the fifth decade.

The contents of a teratodermoid cyst may become infected spontaneously, presumably by a hematogenous route, whereup the cyst is likely to increase rapidly in size. Pressure as well as

toxic symptoms become prominent and rupture into a pleural cavity or a bronchus may prove rapidly fatal. More often infection is secondary to rupture of the cyst into a bronchus with development of a bronchocystic fistula. Such rupture may manifest itself by expectoration of sebaceous material, cholesterol crystals and hair, an event pathognomonic of this condition. Strangely enough, cysts with bronchial communication may exist for years undiagnosed. The signs and symptoms of chronic bronchopulmonary suppuration may or may not be present. A history of expectoration of hair may be elicited only through specific questioning and the diagnosis may not be established prior to surgical intervention.

Extirpation provides the only satisfactory management of teratodermoid tumors and cysts. X-ray therapy is of no value.

BRONCHOGENIC CYSTS. These cysts are considered to arise through the pinching off of a bud of the foregut in the embryo. Most frequently they arise in the middle portion of the mediastinum in relation to the trachea or major bronchi. Similar cysts whose walls are also lined with ciliated columnar epithelium like that of the respiratory tract, are found in relation to the esophagus.

Symptoms, if any, are generally due to pressure on the trachea, bronchus or esophagus, producing shortness of breath, cough, or dysphagia. Generally these cysts cannot be differentiated clinically from other lesions of the mediastinum and their removal is indicated for dagnosis and for the relief of the symptoms.

GASTO-ENTEROGENOUS CYSTS. Among the rarer cysts of the medastinum are those with linings resembling gastric or enteric mucosa. Pressure symptoms and pain are likely to occur, particularly if there is a functional secretory activity of the lining. Peptic ulcer with perforation has been reported.

BENIGN TUMORS OF THE THYMUS. Benign thymoma is a rare tumor of the mediastinum. By x-ray study it generally appears as a flattened density in the superior anterior mediastinum directly behind the sternum. Whether discovered on a routine x-ray or as a result of pressure symptoms, resection is indicated as with all benign mediastinal tumors.

MALIGNANT TUMORS OF THE THYMUS. Lymphosarcoma, carcinoma, Hodgkin's disease and teratoid tumors are described as originating in the thymus gland. These lesions are often difficult to classify, for it may be impossible to determine whether they are primary in the thymus or elsewhere. Well-defined solitary tumors which may be of thymic origin should be removed, if possible.

MEDIASTINAL THYROID. Adenomas of the thyroid, particularly those occurring at the lower poles, will occasionally descend gradually into the anterior mediastinum.

MEDIASTINAL PARATHYROID ADENOMAS. Cope reported 58 parathyroid adenomas in 54 patients. Of these 11 were found in the anterior mediastinum. However, these tumors are rarely large enough to be demonstrable by x-ray.

CONNECTIVE TISSUE TUMORS. These include fibromas, lipomas, xanthomas, chondromas, etc., with their malignant counterparts. Usually they are slow in growth and they may attain huge size (particularly the lipomas) before symptoms become manifest. Symptoms, when present, are generally those of compression. These tumors cannot be differentiated clinically. Removal is always indicated when feasible.

LYMPHOSARCOMA. When this rapidly progressive fatal disease is primary in the mediastinum the tumor usually grows with rapidity and eventually fills the entire mediastium, surrounding and compressing the great vessels, bronchi and other structures. Diagnosis may be difficult during the early stages of the disease, unless an involved peripheral lympth node is available for biopsy. Lymphosarcoma is one of the most common malignancies of the mediastinum and the diagnosis should be suspected when there is bilateral widening of the anterior or middle mediastinum by a tumor with irregular or lobulated borders. In suspected cases a therapeutic test with x-ray is indicated. Rarely a mediastinal lymphosarcoma presents itself as a unilateral circumscribed mass, simulating one of the benign tumors or cysts that have been discussed before.

In the differential diagnosis of mediastinal tumors and cysts one must keep in mind mediastinal and paravertebral abscesses and infectious granulomas such as tuberculomas, or sarcoidosis with mediastinal lymphadenopathy. Echinococcal cysts may simulate the cysts above described. Aneurysms of the aorta or one of its branches may sometimes present a diagnostic

problem, particularly if expansile pulsation of the mass cannot be demonstrated fluoroscopically.

My diagnosis is tumor of the anterior mediastinum. I do not see how it is possible to distinguish between teratodermoid cyst or bronchogenic cyst but because of the age of the patient, the symptoms and especially from a percentage standpoint, I will take teratodermoid cyst as my first and only diagnosis.

DIFFERENTIAL DIAGNOSIS

Dr. Austin Brues: I have called briefly the significant points in this short report. We have a twenty-seven-year-old dentist who, for three months, had anterior chest pain heralded in by shoulder pain, pleural in type, which was increased by respirations and by movements of the trunk. Six weeks before entry he developed a cough, fever was first noted, which was of a mildly septic type. After that he had tachycardia and rapid breathing, but no general prostration. There was a mild anemia, and a minimal clubbing of the fingers; physical and x-ray examinations agree in the mass in the right anterior chest coalescent with the mediastinum, with a small amount of pleural fluid on that side. There are also two collateral observations that I should like to bring up. First the outside x-ray films which, using legal terminology, we might call "hearsay evidence," which may be important. The description given us is that of a cyst containing some fluid, and we should suspect that such a definite description would have been made only if a fluid level had been observed. We therefore have hearsay evidence that, at that time, instead of a solid lesion there was one which was thought to contain fluid and perhaps had a fluid level. The second collateral observation we may class in accordance with our legal analogy as "circumstantial evidence". an operation was performed. The operation must have revealed something of sufficient significance to the Pathology Department to make it the subject of a clinicopathological conference. In other words, something more than pus must have been found.

One bit of evidence that is lacking is a blood smear. Perhaps it was not made. It might encourage or discourage certain diagnosis that I think for other reasons are improbable—namely, tuberculosis, in which the granulocytes are relatively low and the monocytes high; parasitic disease, which is usually accompaned by an eosinophilia; Hodgkin's disease, which often shows a high granulocyte count and possibly eosinophilia; and leukemia, in which a smear may give obvious evidence of the condition.

Dr. Tracy B. Mallory: The white-cell count was 12,400, with 79 polymorphonuclear leukocytes, 11 small lymphoctyes, 8 monocytes, and 29 eosinophils. The red cells and platelets appeared normal.

Dr. Brues: We have a process limited to the right chest with initial pain suggesting pleural involvement. I do not believe there was massive pleural involvement, such as we might expect with an endothelioma of the pleura, because of the small amount of fluid that is reported. We do however expect to find something encroaching on the pleura and giving the first symptom in that way.

I should like next to consider fever as a symptom. This suggests primary infection, some lesion secondarily infected or a series of other conditions that might be febrile, such as Hodgkin's disease, sarcoid and metastatic disease; of the latter, Ewing's tumor is the only commonly febrile representative and is out of the question without evidence of a primary lesion. I shall pass over sarcoid, and say in connection with Hodgkin's disease that the reported nonlobulated configuration of the growth, the fact that pain was the first symptom and occurred long before the others, and the fact, if true, that a fluid level was seen are against the diagnosis. Furthermore, fever in Hodgkin's disease is usually observed either in advanced cases or in cases with posterior rather than anterior mediastinal involvement.

It might be appropriate to take up the x-ray films at this point.

Dr. George W. Holmes: The films that I have put up cover a period of about three months. They show a very large mass that occupies the midchest. In the anteroposterior view it also appears to be in the midportion rather than in the front or back. It is of some interest that a mass as large as that does not displace the heart. We might assume that the lung was collapsed behind it, so that we do not see it, and that one compensates the other and there is no displacement. There is evidence in this film of a small amount of fluid in the pleural space. The mass is homogeneous, with sharply defined borders, and is not lobular.

Dr. Brues: Does this exhibit include the plate

taken in the outside hospital on which I was speculating?

Dr. Holmes: No. Of course that would be of great value.

In the spine the fifth lumbar vertebra has a narrow posterior portion. I do not believe that this represents metastatic malignancy.

Dr. Brues: We must still consider primary infections and secondarily infected processes. I shall first mention the possible primary infections. There was no history of pneumonia, and the x-ray films do not suggest that the lesion was of that type. The course was not septic enough to suggest a large encapsulated empyema, and I suspect that the rounded lower border of the mass by x-ray makes an interlobar accumulation of fluid or pus unlikely.

Tuberculosis, of course, is suggested by the first few lines in the record. The significant point against tuberculosis is the absence of disease in the apices. One might also think of two other processes similar to tuberculosis but without the same tendency to occur in the apices—actinomycosis and streptothricosis. Either of these, however, should give greater prostration.

An amebic abscess working its way up from the liver is indicated in the beginning of the history since the pain occurred in the shoulder, suggesting something in the region of the diaphragm. One might think of an amebic process passing from the liver through the diaphragm, settling in the lung and giving these symptoms. Again, one would expect considerable prostration.

Against echinococcal disease is the fact that the patient was apparently a confirmed Bostonian.

Did he have a lung abscess? Such a process would have been walled off rather thoroughly, since there was no sputum, which is strongly against the diagnosis. Furthermore, the x-ray films show no particularly marked degree of infiltration around the process.

The fact that the fever occurred late suggests a secondary process. Cancer of the lung, centrally located, can be walled off so that no sputum appears, but this is unusual. The patient was young for cancer to occur, but not too young. In its favor is the lack of displacement of the mediastinum, such as may occur in an infiltrative lesion. Against it, for the same reason, is the absence of infiltration in other directions.

Two other processes start early in life and give their peak incidences of trouble in the third decade, namely, congenital cystic disease and dermoid cyst. Both of these may show a fluid level at some time. Dermoids are particularly likely to occur in the anterior part of the chest coalescing with the mediastinal shadow and appearing low in the lung fields. One would expect a dermoid to displace the mediastinum to the opposite side, and that worried me somewhat, but I was inclined to pass that off, and Dr. Holmes has given me assistance in doing so. Therefore, because of the age, the location, the recent febrile course, the absence of sputum and the lack of definite evidence against it, I shall make the diagnosis of dermoid cyst, secondarily infected.

Dr. Mallory: What was the line of argument before operation, Dr. Brown?

Dr. Robert K. Brown: We thought the lesion probably was a dermoid cyst. The patient was extremely sick when he came in. His pulse is recorded at 120, but it ranged from 120 to 140 and did not go down after a week's rest in bed. The temperature went up and ranged from 100 to 102°F., not a definite septic temperature. Dr. Churchill thought that the patient was not in condition for open thoracotomy such as would be required in an attempt to remove the whole lesion, and decided merely to explore under local anesthesia through an anterior incision.

Dr. Mallory: I think you might as well go ahead and tell the operative findings.

Dr. Holmes: May I say a word first? If you arrive at a diagnosis of cyst there are some points in the x-ray examination that may help to decide between dermoid and other forms of cyst. For instance, an echinococcal cyst usually has calcified walls, and a dermoid cyst often shows variations in density within the cyst itself, such as teeth and areas of markedly diminished density due to fat. Although the latter may also look just like this one, the absence of variations in density is perhaps against it.

Dr. Richard Sweet: I have just taken a dermoid cyst out of a mediastinum that showed marked calcification in the wall.

CLINICAL DIAGNOSIS

Dermoid Cyst.

DR. BRUES'S DIAGNOSIS

Dermoid cyst, secondarily infected.

ANATOMICAL DIAGNOSES

Teratoma of mediastinum, with extension to middle lobe of right lung and metastases to liver and vertebras.

Pathologic fracture of fifth lumbar vertebra.

Collapse of right lung, massive.

Bronchopneumonia, slight, of left lung.

Ascites.

Operative wound: exploratory thoracotomy.

PATHOLOGICAL DISCUSSION

Dr. Mallory: Will you tell us the operative findings, Dr. Brown?

Dr. Brown: A large mass was found with a solid wall about 1 cm. thick and a necrotic center consisting of gray mushy material.

Dr. Mallory: A biopsy specimen showed a tumor which in part appeared to be carcinomatous with some rather poorly formed glands, which were enough to justify one in thinking of it as adenocarcinoma. Other portions of the tumor were composed of long spindle cells that looked fibroblastic. We though we were probably justified in assuming that there were two kinds of cells and that this was therefore an undifferentiated teratoma rather than a carcinoma. Following that, x-ray treatment was given. Dr. Brown will tell the rest of the story.

Dr. Brown: The lesion did not change with 1,000,000-volt x-ray therapy, even in large dosage. In two months he came in again with a pathologic fracture of the fifth lumbar vertebra, which was treated by x-ray; the patient was put in a plaster shell. Two months later he came back terminally, with a large liver and ascites; he died in six days.

Dr. Mallory: At post-mortem examination we found a large tumor in the anterior mediastinum projecting into the pleural cavity. It was very firm and was adherent to the middle lobe of the right lung, and on section it was possible to show that it had invaded the middle lobe. That left two possibilities—it was either a mediastinal teratoma with secondary invasion of the lungs or a primary carcinoma of the lung spreading into the mediastinum. It seemed to us from gross examination that the latter was unlikely since the tumor was largely at the periphery of the lung and the bronchi were entirely uninvolved, carcinoma of the lung with negative bronchi being, of course, a rarity. Coupling that with the peculiar histologic character we felt justified in continuing to call this a teratoma. There were extensive metastases to the liver and bone marrow, and the fifth lumbar vertebra was involved; there was nothing else of interest. The tumor was perfectly solid at the time of autopsy and nothing suggested at that time that it had ever been cystic. I am not quite clear from the surgical report whether it was cystic at the time of operation. The center was soft, but no fluid or air was reported.

Dr. Holmes: Were there any signs of x-ray treatment?

Dr. Mallory: The tumor was almost totally necrotic. We could hardly find a viable cell in the mediastinal tumor in contrast to the liver, where the histology was essentially that of the biopsy specimen.

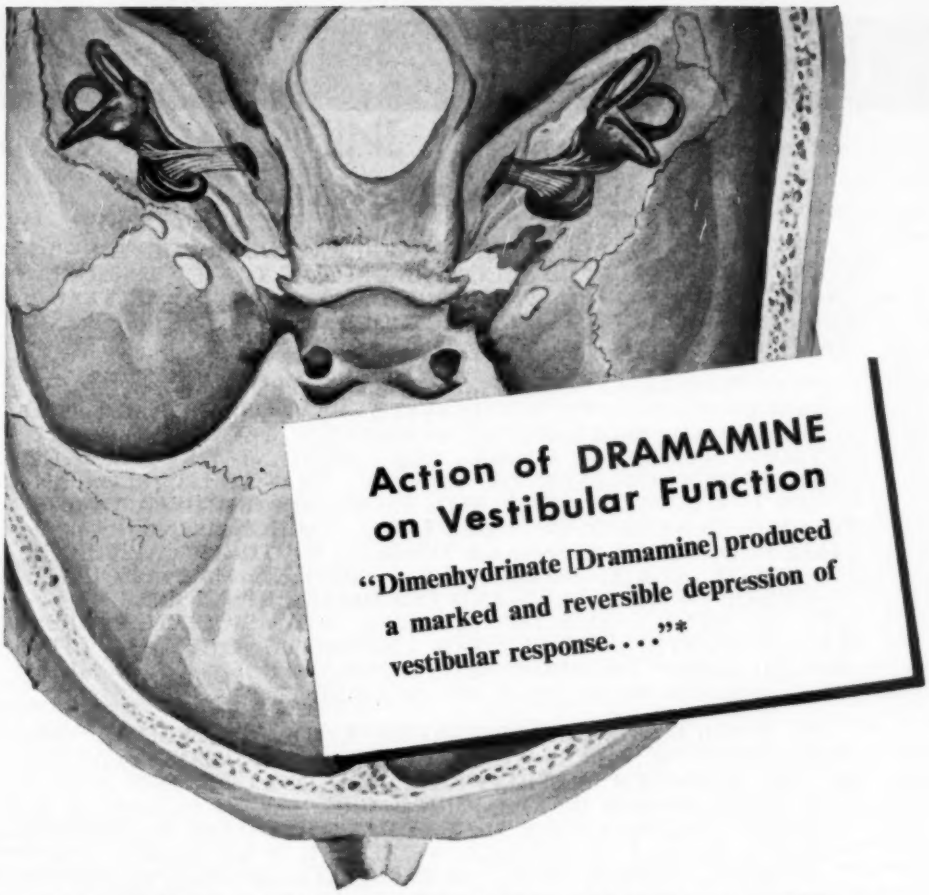
Dr. Holmes: I suppose that the change in the fifth lumbar vertebra does represent a metastasis. However, it is wedge shaped, the reverse of what it should be with a pathologic fracture.

ANNOUNCEMENT OF MEETINGS AT UNIVERSITY OF TEXAS

Several meetings of interest to scientists and physicians will be held at the Texas Medical Center, Houston, Texas, on April 25 and 26.

These will include the *Sixth Annual Symposium on Fundamental Cancer Research* of The University of Texas M. D. Anderson Hospital for Cancer Research. One half-day will be devoted to selected papers on the subject of nutritional factors in cancer. *The Cancer Pathology and Radiology Conference* of The University of Texas M. D. Anderson Hospital and Postgraduate School of Medicine will be on *Tumors and Other Diseases of Bone.* A meeting of the *South Central Section* of the *College of American Pathologists* will co-participate in the Symposium and Pathology Conference. There will be papers of general interest to pathologists. Dr. M. M. Wintrobe, Professor of Medicine at the University of Utah is arranging the session on nutritional factors in cancer. Dr. Granville Bennett. Professor of Pathology of the University of Illinois, and Dr. L. Henry Garland, Professor of Radiology at Stanford University Medical School. will jointly conduct the conference on *Tumors and Other Diseases of Bone.*

The third Bertner Foundation Lecture and Award will be made at the banquet on April 25. All meetings will be held at The Shamrock. Further information may be obtained from William O. Russell, M.D., at 2310 Baldwin Street, Houston 6, Texas.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*Gutner, L. B.; Gould, W. J., and Batterman, R. D.: Action of Dimenhydrinate (Dramamine) and Other Drugs on Vestibular Function, Arch. Otolaryng. *53*:308 (March) 1951.

RESEARCH IN THE SERVICE OF MEDICINE **SEARLE**

THE *Secretary's* MESSAGE

ANNUAL MEETIN' TIME

IT IS NOT TOO EARLY TO MARK YOUR CALENDAR FOR THE BIG EVENT – *THE SIXTY-FIRST ANNUAL MEETING OF YOUR ASSOCIATION*. THE TIME–*APRIL* 30 THROUGH *MAY* 3, 1952, TO BE EXACT. THE PLACE – *PHOENIX*, WITH HEADQUARTERS AT *HOTEL WESTWARD HO*.

AN OUTSTANDING *SCIENTIFIC SESSIONS* PROGRAM HAS BEEN ARRANGED TO INCLUDE OUT-OF-STATE GREAT ORATORS: OSBORNE A. BRINES, M.D., PROFESSOR OF PATHOLOGY, WAYNE UNIVERSITY, DETROIT; HAROLD E. CROWE, M.D., ASSISTANT PROFESSOR OF ORTHOPEDICS, COLLEGE OF MEDICAL EVANGELISTS, LOS ANGELES; L. MAXWELL LOCKIE, M.D., PROFESSOR OF THERAPEUTICS, BUFFALO UNIVERSITY, BUFFALO; IAN G. MACDONALD, M.D., ASSOCIATE CLINICAL PROFESSOR OF SURGERY, SOUTHERN CALIFORNIA UNIVERSITY, LOS ANGELES; HALE F. SHIRLEY, M.D., ASSOCIATE PROFESSOR OF PEDIATRICS AND PSYCHIATRY, STANFORD UNIVERSITY, SAN FRANCISCO; SCOTT M. SMITH, M.D., ASSOCIATE PROFESSOR OF ANESTHESIOLOGY, UTAH UNIVERSITY, SALT LAKE CITY; AND WILLIAM P. THOMPSON, M.D., CLINICAL PROFESSOR OF MEDICINE, COLLEGE OF MEDICAL EVANGELISTS, LOS ANGELES.

ALL PHYSICIANS MEMBERS WHO HAVE VOLUNTEERED TO PRESENT SCIENTIFIC PAPERS WILL LIKEWISE BE AN IMPORTANT PART OF THE SCIENTIFIC SESSIONS AND WILL INCLUDE: DRS. MARCY L. SUSSMAN; BENSON BLOOM; JOHN R. GREEN WITH RICHARD E. H. DUISBERG AND WILLIAM B. McGRATH PARTICIPATING; W. WARNER WATKINS; JULES L. WHITEHILL; FRIEDEL B. SCHUTZBANK; JAMES T. EMERT; C. THOMAS READ; LOUIS G. JEKEL; MONROE H. GREEN; E. PAYNE PALMER; WILLIAM G. SHULTZ; CLARA S. WEBSTER; LUDWIG A. LINDBERG; DOUGLAS D. GAIN; ROBERT A. PRICE; AND CHARLES L. VON POHLE.

THE *PRESIDENT'S DINNER-DANCE* WILL BE HELD FRIDAY EVENING, MAY 2ND, IN THE FIESTA ROOM, HOTEL WESTWARD HO, AT 8:00 P.M., PRECEDED BY A SOCIAL HOUR AT THE HOME OF DR. AND MRS. FRANK J. MILLOY, 18 N. COUNTRY CLUB DRIVE, SCHEDULED FOR 6:30 P.M.

A FULL DAY FOR OUR *GOLFERS* IS SCHEDULED FOR SATURDAY, MAY 3RD, AT PHOENIX COUNTRY CLUB, FOLLOWED BY A SOCIAL HOUR.

COUNCIL WILL HAVE A DINNER-MEETING TUESDAY, APRIL 29TH, FOLLOWED BY THE ANNUAL CORPORATION MEETING OF BLUE SHIELD. THE HOUSE OF DELEGATES IS SCHEDULED TO MEET WEDNESDAY AND FRIDAY MORNINGS, APRIL 30TH AND MAY 2ND. THE GENERAL SESSION WILL BE CONDUCTED WEDNESDAY MORNING, APRIL 30TH.

MORE DETAILS WILL SOON FOLLOW, SO REMEMBER – *ANNUAL MEETING* – PHOENIX – APRIL 30 THROUGH MAY 3, 1952 – AND PLAN NOW TO PARTICIPATE.

Editorial

ARIZONA MEDICINE
Journal of
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VOL. 9 MARCH, 1952 NO. 3

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The Editor sincerely solicits contributions of scientific articles for publication in ARIZONA MEDICINE. All such contributions are greatly appreciated. All will be given equal consideration.

Certain general rules must be followed, however, and the Editor therefore respectfully submits the following suggestions to authors and contributors:

1. Follow the general rules of good English, especially with regard to construction, diction, spelling, and punctuation.
2. Be guided by the general rules of medical writing as followed by the JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION. (See MEDICAL WRITING by Morris Fishbein.)
3. Be brief, even while being thorough and complete. Avoid unnecessary words. Try to limit the article to 1500 words.
4. Read and re-read the manuscript several times to correct it, especially for spelling and punctuation.
5. Submit manuscript typewritten and double-spaced.
6. Articles for publication should have been read before a controversial body, e.g., a hospital staff meeting, or a county medical society meeting.

The Editor is always ready, willing, and happy to help in any way possible.

The Treatment Of Tuberculosis
SECTION II

(This summary of modern therapy was started in an editorial last month, will be concluded now with comments on Collapse Therapy, Resection, Rehabilitation, and After-Care. Non-pulmonary lesions have not been considered).

A. REVERSIBLE COLLAPSE THERAPY.– It should be mentioned again that the indications for all collapse or excision methods are thoroughly scrambled, due in part to new procedures and in even greater part to chemotherapy.

The *permanance* of collapse therapy is a most important quality, and some of the 'reversible' methods do not always deserve the name.

Extrapleural pneumonolysis, for instance, was once routinely followed by pneumothorax, and was called reversible. Most lesions require a more permanent collapse, however, and ex trapleural should usually be aimed at such an effect, of made permanent by replacement with another operation.

Phrenic nerve operations should consist of careful crushes unless function is never again wanted—a rare situation. The crushes are still not certain to paralyze the diaphragm, nor is the paralysis certain to clear in all cases. The permanence of phrenic operations can not be depended upon. Temporary phrenics are currently used in two situation,—as an adjunct to a pneumoperitoneum, usually when the status of the PNP has been noted and found wanting; as a fill-in for a lobectomy, usually of a lower lobe. A few other indications may occur, but they are not frequent.

Intrapleural pneumothorax has waned in popularity in most areas so that new inductions may be quite rare. The cause is partly the success of chemotherapy, the value of pneumoperitoneum, and the use of resection or permanent collapse without an interlude of pneumothorax. It is also largely due to the realization that pneumothorax is not uncomplicated and often not reversible. Pleural thickening, poor expansion, and 'bound' lungs occur too often to be overlooked unless there is no alternative. Fortunately effusions, empyemas, and atelectasis from acute tuberculous bronchitis are all minimized by chemotherapy, so that a collapse is safer than it was five years ago. When pneumothorax is used, complications may be further decreased by terminating the collapse as soon as certain signs appear. The patient is often the chief obstacle to such a short course.

Pneumoperitoneum is still a controversial method, but its use increases almost everywhere. Its chief advantage is reversibility; it can be

used as an adjunct to the drugs and bedrest until the often bilateral lesions are healed, or until they have localized to the point where a locally applied method is feasible. PNP can then be discontinued, in a short time and with small chance of complications. The disadvantages include a remoteness from the apices, and the inertia which a partly effective method seems to produce in patient and physician. The value of PNP is hard to estimate, but it is surely considerable in many cases.

B. PERMANENT COLLAPSE THERAPY.—The correct use of a permanent method is also uncertain. It chiefly depends upon the surgeon, and it may consist (when resection is not chosen) of a decision between the 'conservative' thoracoplasty and other, less tried-and-true operations. Many thoughtful surgeons prefer thoracoplasty, in spite of its deformity and loss of chest-wall support. They have additionally used such gimmicks as (a) the 'squared-off' thoracoplasty; (b) 'delayed costectomy' (after separation of the periosteum and fascial bundles from the ribs); and (c) a 'waterfall' thoracoplasty (done after an upper lobectomy by removing only 2 cm. sections from the posterior and lateral parts of the upper 4 or 5 ribs.) These modifications improve the collapse (a); reduce the paradox (b), and simplify the operation (c).

Extrapleural pneumonolysis can be made into a permanent collapse by the use of certain new materials in place of air or oil. Wax is safe for small apical pockets; lucite spheres may be used for larger spaces; and sponge materials have recently been tried. The hazards and effectiveness of lucite and sponge are not yet well-known, but the advantages of extrapleural collapse (intact chest wall, greater directed collapse, and the least loss of lung function of any operation) suggest that some suitable medium will be found.

Other relatively untried operations include thoracoplasty with insection of an extra-fascial strut, the placement of lucite spheres between denuded ribs and the depressed fascial bundles (permanently or until the collapse is 'fixed'), etc. Research surgeons have from 50 to 150 of these cases, and sufficient data should soon be forthcoming. The Monaldi and cavernostomy procedures are rarely indicated or done.

C. PULMONARY RESECTION.—Resection is now The Mode. Theoretically it is the best operation of all, since a removal of the necrotic lung tissue is the best for the body. Practically, like all major chest surgery, the operation has become quite safe; anaesthesia, replaced blood, better technique, antibiotics, and improved general care are now combined to lower the morbidity and mortality nearly to zero.

Some clinics are using resection for almost every type of lesion. The indications are increasing in number even by conservative standards. Destroyed lungs, bronchial stenosis, basal cavities, collapsed but unhealed lesions, et al., are joined by chronic fibro-cavitative lesions which would collapse poorly, 'round focus' lesions which continue to spill a few bacilli, any large cavity, etc. These indications are sounder when the lesion is restricted to a lobe, but a Saranac V.A. group is now using chemotherapy from 6 to 18 months and then removing all residual nodules above a certain size by segmental resection. (This last routine is not yet a confirmed practice).

The exact place of resection in the future depends on summaries now being made. Past experience suggests that results will be variable in different hands, but a general agreement should be reached—until further hoped-for miracles change the balance again.

D. REHABILITATION.—A few comments should be made on care-after-treatment. It is a time for reinforcing the results of therapy, preventing recurrence, and an everlasting survey of progress "in a disease which tends to heal incompletely and to relapse."

1. Continue treatment and a close laboratory observation after the few months of what may be a 'drug remission'. The gastric cultures may return to positive, a signal of incompletely healed disease.

2. Use exercise as a medicine, to be given in measured doses, and with regular increases depending on time, x-ray films, and bacterial studies.

3. Continue restrictions on exercise, and insistence on extra rest, indefinitely in most cases. Occupations and entertainment can almost always be changed to fit the needs.

4. Check on the symptoms, signs, x-ray findings, and bacterial studies at regular intervals. This check-up may vary from 2 months in recent 'cures' or suspected activity to 6 months in stable lesions (and individuals). Small films may be used in late follow-ups. Gastric aspirations

should be used when sputum is negative. Cultures are about equal to a guinea-pig in efficiency.

The disease is the patient's, and he must understand it and arrange for its care, but the responsibility is generally considered to be shared by the physician. *The treatment should be continued forever.*

TOPICS OF *Current Medical* INTEREST

RX, DX, AND DOCTORS

By GUILLERMO OSLER, M. D.

The V. A. continues to put on their excellent Conferences on CHEMOTHERAPY OF TUBERCULOSIS. The Eleventh was held in January in St. Louis, with more than 100 V.A. and civilian consultants present. . . . We can jump the gun on official reports by noting several of the high points,—1. Streptomycin and dihydrostreptomycin are about equal in both good and bad effects. 2. One gram of SM twice a week, and 12 grams of PAS daily is the best regimen. 3. The use of the combined routine is producing some good results even in cases resistant to SM. 4. The extrapulmonary complications of tb. are decreasing, due to chemotherapy of lung disease. 5. Cavities can be sterilized by long continued therapy, in spite of the persistence of acid fast bacilli. 6. DHSM does not produce the feared ototoxicity with the doses suggested. 7. Benamid may be of future value in sustaining the blood level of SM. 8. Mycomycin has been abandoned. Viomycin has not measured up. Terramycin has little effect in tb. (9. The Women's Home Companion has scooped other journals by an article on segmental resection!).

The second favorable piece of news concerning the effect of CHEMOTHERAPY IN PRIMARY TUBERCULOSIS comes from the same place as the first. The N.Y.U.-Bellevue Medical Center confirms its first reports. . . . Chemotherapy has entirely changed the immediate prognosis. The case fatality rate has dropped from 18% before streptomycin to 3% after it. . . . Recovery from tuberculous meningitis, treated by them with SM, occurs in 2 out of 3 cases.

The communicable disease summary by the Arizona State Dep't. of Health shows some interesting figures for TUBERCULOSIS. There were 3708 cases reported in 1951, versus 2683 cases in 1950. . . . An increase of a thousand cases can only mean better case-finding or better case-reporting. In either case, here's a cheer for a triumph by the Dep't. and the state M.D.s. After years of heckling, this Osler refuses to look too closely.

The value of ROUTINE CASE-FINDING X-RAYS IN HOSPITALS is emphasized by Dr. Edward Kupka, tuberculosis control director in California. . . . Dr. Kupka reports (by personal communication) that one-tenth of the new cases being reported in California come from the huge routine survey of admissions to the Los Angeles County Hospital.

Look who's practicing medicine on DOCTORS! Trans World Airlines (TWA) tells physicians thruout the United States (and even California) that a Quickie Vacation in the clear dry desert air is just the things to get one away from the office, and good medicine too. . . . They at least have literary (if not medical) license.

ANTIBIOTICS

Dr. Frank Meleney (a onetime Arizona Medicine contributor) reports that the nephrotoxic elements of BACITRACIN are so greatly reduced that it may be safely used systemically.

TERRAMYCIN was reported to be effective on pinworms (enterobiasis) in animals. It has now been found 100% successful in 30 cases in humans. Scotch tape impressions were negative for ova by the second post-treatment day, and no evidence of relapse occurred in the five week observation period.

Arizona is bracketted by TYPHUS, tho it is endemic; New Mexico had it, and now it is reported in California. . . . The latter occurrence was not in cosmopolitan, brash, waterfront Los Angeles, but in gentle Altadena in the north part of Pasadena. . . . Rats moved out of a demolished barn into nearby houses, and their fleas moved from the rats to pets and humans. Then the health department moved into Altadena.

So this nurse says to me, "You know what they're using for VIRUS FLU now?" "No, what?" says I. "Penicillin and streptomycin", she says proudly, "my mother gets hypodermics every day". I count to a hundred, then go ahead anyway,— "Lady, 'they' are always using something. Antihistamines, penicillin, and so on, and so forth. Preferably by hypo. Did you hear, yet, that 'colds', 'flu', or 'grippe', or 'virus infection' had a cure? Did you hear. . . .?" Well where did that lady go?!

Do you casually wonder how much actual progress has been made in MALARIA THERAPY?

Casual, unless you see one of the occasional cases flown back to Arizona from the area south of Mexico City. . . . The chief advance during the war was a recognition of Atabrine (also called quinacrine and mepacrine). Atabrine is less toxic than quinine; when properly given it works faster; it is a practical cure for the most common and fatal type (falciparum). . . . It suppresses but does not cure the vivax type, thus allowing late relapses. . . . An organized examination of 14,000 compounds was not helpful during the war, but was a classic search, and produced at least two drugs of value. It also produced a huge volume of knowledge about malaria and pharmacology in general. . . . Chloroquine (called Aralen or SN 7618) is better than Atabrine as a suppressive and for ending acute attacks of vivax. Pentaquine (or SN 13,276) can be used alone or with quinine for a 'radical cure' of vivax. . . . The British found 'paludrine', a great early starter, but productive of resistant strains. . . . Recent news reports have told of the notable values of primaquine, but we must wait for the published studies and a greater usage. . . . We are apparently nearer the 'magic bullet' for malaria.

The place of vitamin B 12 in the ETIOLOGY AND THERAPY OF ANEMIAS is more clearly being described. Dr. W. B. Castle, student of the late Dr. George Minot, and originator of the first schema, now calls gastric secretion the 'intrinsic factor' and vitamin B 12 (or closely related compounds) the 'extrinsic factor' in pernicious anemia. . . . In general, normal hematopoiesis requires vitamin B 12, folic acid, and ascorbic acid. Some form of anemia may follow the lack of any of the three substances.

BRAIN WAVES may some day be of help in vocational guidance. It has been shown that there are personality differences which coincide with electroencelphalogram findings. . . . Drs. Travis and Bennett of U.S.C. showed that persons who have a predominance of alpha waves are 'quick deciders'. Those with beta waves are sensitive to details, and are worriers. . . . The personality tests were made with Rorschach ink-blots.

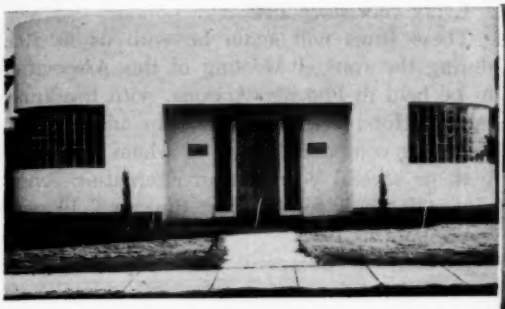
A neat and precise article on 'APPLIED PSYCHOSOMATIC MEDICINE IN GENERAL PRACTICE' appears in the August issue of ANNALS OF WESTERN MEDICINE and SURGERY. The author is Dr. Robert Crede of the division of medicine, U. of Cal. . . . It is well-subdivided, and proceeds on the basis that valuable information about the patient's background and personality structure can be obtained by a special simple approach. He then tells how to obtain it. . . . How does the patient tell his story? How does he react to it? What unusual points are there in his development, his family, his childhood, his sex-life, his symptoms? What attitude should the physician take? When should he take action, observe, be patient? How? . . . Not a bad outline—and he actually thinks that the average physician can use it.

Five members of the medical and pediatric sections of the Mayo Clinic have used CORTISONE ON A CASE OF TETANUS. . . . The object was not to change the course of the toxic infection, but to help the patient survive while healing the disease, and to attenuate hypersensitivity of various sorts. . . . One case has been reported with abruptly good results. Sedatives, antibiotics, wound cleansing, and antitoxin were administered as usual for a situation which included trismus and tetanospasms. An unfavorable progress was arrested and reversed after tracheotomy and exhibition of cortisone. It was felt that the drug was the cause of the improvement. . . . It should be worth further trial.

Wannamaker, Rammelkamp, et al., have added to their earlier series on PROPHYLAXIS OF RHEUMATIC FEVER in an article in the American Medical Journal. . . . They have 1,178 patients with exudative tonsillitis or pharyngitis which were treated by penicillin, and 1,162 non-treated controls. Penicillin (G, procaine, in oil) was used in 3 dosage schedules, and early use of 1.2 million units in 3 doses was the most effective. . . . In the control series, 28 definite and 7 possible cases of rheumatic fever occurred; in the treated series, 2 definite and 3 possible cases were found.

A few snake-pit movies and a few articles in national magazine have started the state institutions on another necessary surge to improve CARE OF THE MENTALLY ILL. . . . 'Hospital Management' has a list of quotations from the Governors of two dozen states, telling what their states are doing or intend to do. Governor Pyle briefly says that "Arizona hopes soon to be in the forefront of the states whose mental hospitals have been brought up to the highest possible standards of therapeutic and custodial care" . . . Public prodding is a great need when the situation is so huge and inert and obscure. (Anyone who mentions Winnie Ruth is out of bounds. Judge not, lest ye also be Juddged).

If one should speak of W.R.J., one could mention the tuberculosis sanatorium (La Vina) in Altadena, California, where she was a patient about 30 years ago. . . . Everyone at La Vina tingles slightly on the occasions when Winnie 'attains her freedom'. She returned there once, just after the unfortunate dismemberments, hid out in an old cottage on the hillside, lived on purloined milk, and slipped away before being discovered. . . . The patients and staff at La Vina follow all bulletins from Phoenix—and cheer for a thirty-year 'cure' of tuberculosis.



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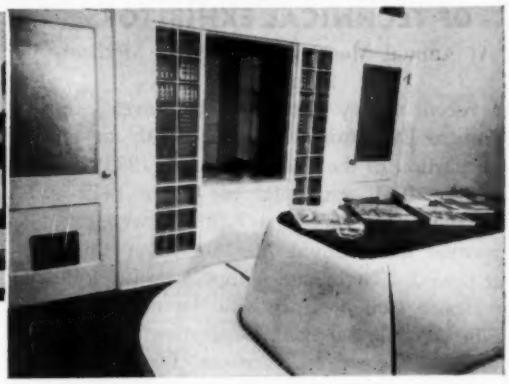

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THE HONOR ROLL OF TECHNICAL EXHIBITORS

At Annual Meetings of Arizona Medical Association

A recent survey just completed reveals those Technical Exhibitors who consistently or for a large portion of the years checked (1939 to and including 1951, excluding the years 1945 and 1949, when no Technical Exhibits were held) supported our Annual Meetings over this 13-year period. Their names appear on the following Honor Roll of firms who have been loyal to The Arizona Medical Association:

Ayerst, McKenna & Harrison, Limited, New York, New York—8 times and every year since 1946.

Don Baxter, Inc., Glendale, California—9 times and every year since 1946.

Ciba Pharmaceutical Products, Inc., Summit, New Jersey—10 times.

The Coca-Cola Company, Atlanta, Georgia—Every year since 1948.

Doho Chemical Corporation, New York, New York—4 out of the last 5 years.

General Electric Company, Los Angeles, California—11 times.

Lanteen Medical Laboratories, Evanston, Illinois—4 out of the last 5 years.

Eli Lilly and Company, Indianapolis, Indiana—6 times and every year since 1948.

M & R Laboratories, Columbus, Ohio—8 times and every year since 1947.

Mead Johnson & Company, Evansville, Indiana —12 *times and every years since* 1939.

Parke, Davis & Company, Detroit, Michigan—Every year since 1948.

Pet Milk Company, San Francisco, California—10 times.

A. H. Robins Co., Inc., Richmond, Virginia—4 out of the last 5 years.

Sandoz Pharmaceuticals, San Francisco, California—8 times and every year since 1948.

G. D. Searle & Co., Chicago, Illinois—Every year since 1948.

Smith-Dorsey, Lincoln, Nebraska—Every year since 1948.

Southwestern Surgical Supply Co., Phoenix, Arizona—12 *times and every year since* 1939.

Standard Surgical Supply Co., Inc., Phoenix, Arizona—Every year since 1946.

Westinghouse Electric Corporation, San Francisco, California—7 times and every year since 1948.

Winthrop-Stearns Inc., New York, New York—Every year since 1948.

These firms will again be with us in 1952 during the Annual Meeting of this Association to be held in Phoenix, Arizona, with headquarters at Hotel Westward Ho. In addition, the following companies, some of whom have been with us several years on an alternating schedule, and others for the first time, will likewise participate in 1952:

The Borden Company (Maricopa Division, Phoenix, Arizona.

Marlyn Company, Inc., Los Angeles, California.

McNeil Laboratories, Inc., Hollywood, California.

The Wm. S. Merrell Company, Cincinnati, Ohio.

Medco Products Company, Tulsa, Oklahoma.

E. S. Miller Laboratories, Inc., Los Angeles, California.

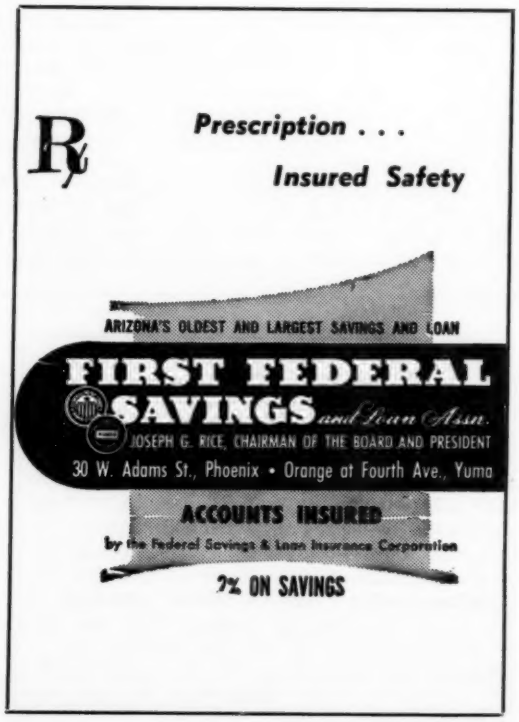
The National Drug Company, Philadelphia, Pennsylvania.

Chas. Pfizer & Co., Inc., Brooklyn, New York.

Philip Morris & Co. Ltd., Inc., New York, New York.

Western Surgical Supply Co., Ltd., Los Angeles, California.

ALL OF THESE FIRMS DESERVE YOUR SPECIAL ATTENTION AND RECIPROCAL SUPPORT.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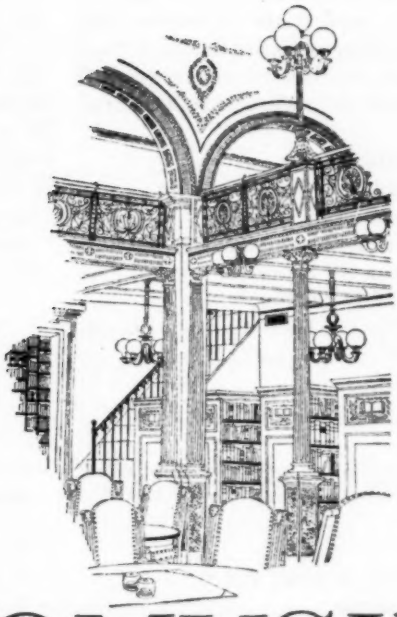

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Throughout the world, as in the United States, aureomycin is recognized as a broad spectrum antibiotic of established effectiveness.

Capsules: 50 mg.—Bottles of 25 and 100. 250 mg.—Bottles of 16 and 100.
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Poliomyelitis Management Technique

The following recommendations for care of Poliomyelitis were read at the November 5th County Society meeting by Carlos Craig. It was of such general interest that we were requested to print it and make it available to all Society members.

ALL POLIO ADMISSIONS–

1. Mattress board–foot board.
2. Routine C.B.C. and Urinalysis.
3. Spinal tap on admission unless onset has been less than 24 hours previous.

IF DIAGNOSIS IS POSITIVE–

1. Regular Hi-Protein Diet for age; Except, no milk, milk shakes, malts, eggnogs, ice cream or cream soups.
2. Additional fruit juices three times daily.
3. Vitamins.
4. NaCL t.i.d. when hot packs are started.
5. A.S.A. or A.P.C. every four hours P.R.N. for discomfort.
6. Enema P.R.N.
7. Catherize every 8 hours P.R.N.
8. Intake and output.
9. Daily fluid intake to be kept up to following:
   a. 1-5 years 1500 c.c.
   b. 5-10 years 2000 c.c.
   c. 10-15 years 2500 c.c.
   d. 15 years 3000 c.c.

   (NaCL per day should not exceed 5 gms.)
10. No packs until patient is relatively afebrile (101 oral–102R).
    Back–neck and both lower extremities to be packed on all acute cases.
    Other areas as ordered. Chest on all bulbars and high cervicals.
    Packs to be given 1 hour on–1 hour off–9 a.m.–8 p.m. with additional packs for severe spasm.
11. Orthopedic consultation at end of 7 days or earlier if patient is afebrile.
12. Patients are to be kept flat until otherwise ordered by the Orthopedic Consultant.
13. Physiotherapy on order of orthopedic consultant.

*Atropine, opium, or barbiturates, or any of their derivatives may not be given to patients demonstrating the following symptoms:–

1. Chest pain. 2. Difficulty in swallowing.
3. Excessive amount of mucous in nose and throat.
4. Voice and speech changes.
5. Cyanosis. 6. Facial twitchings.
7. Flaring nostrils. 8. Visual disturbances.
9. Spasms of intercostals or diaphragm.
10. Any use of accessory muscles to assist breathing.
11. Diaphoresis.

Aspirin, A.P.C., and Chloral Hydrate *only* may be given. Smoking and flowers are not permitted.

II. *Polios with cervical involvement: i.e. patients demonstrating chest pain–cyanosis–flaring nostrils–spasm of intercostals or diaphragm.*

1. Chest packs.
2. Nasal oxygen–2 to 4 per minute continuously.
3. Ventilation readings every hour if patient will co-operation. Place in respirator if readings approach minimum Vital Capacity.

III. *Polios with bulbar involvement i.e.–Patients demonstrating difficulty in swallowing–mucous–voice and speech changes–*

1. Prone Trendelenberg.
2. Suction P.R.N.
3. Clear liquids only if tolerated.
4. Tracheotomy when indicated.
5. Respirator following tracheotomy if patient is not ventilating.

IV. *Polios with encephalitis.*

1. Nasal oxygen.
2. 10% dextrose in water I.V. if indicated.

TRACHEOTOMY CARE:–

1. Nothing by mouth 4-7 days.
2. Clear liquids or if patient is tube fed:–
   a. First 24 hours water ounces one to two every hour.
   b. Second 24 hours, use five per cent glucose in water.
   c. Formula thereafter.

RESPIRATOR CARE:–

1. Pressure:–Normal tidal exchange (determined by use of ventilation meter).
2. Negative pressure only to be used on tank.
3. Negative pressure not to exceed 20 cms. If normal ventilation cannot be achieved in this manner, tracheotomy is performed so that Bennett positive pressure can be used.
4. C.B.C.–Urinalysis–Carbon Dioxide combining power – N.P.N., Total Proteins, Chlorides, A/G Ratio from 2 times weekly to 1 time per months as patient improves.
5. Change Ph (Urine) every 2 weeks.
6. Retention catheter after patient has been unable to void for 24-48 hours–to remain in until patient is afebrile.

CAVEAT EMPTOR*

Treatment by a practitioner of one school of medicine cannot be adjudged malpractice by the standards of any other school of medicine. The decisions in two cases recently reviewed by the Michigan Supreme Court emphasizes this point, and, in effect, put the public on notice to be wary, since *there is more than one standard of medical practice.*

Standards for the practice of the healing arts have been established and improved by doctors of medicine for many years and have been widely publicized and accepted. The entry of other systems of practice with their claims to equality and even superiority and their not too clearly defined methods of practice is responsible for the confusion now disclosed by the Court.

Patients who select *any* healer, assuming that all have the same standards, belately discover, when they find themselves aggrieved, that what they thought was the real article was something of foreign quality based on a different set of standards.

Illustrative of this rude awakening are the two cases referred to above: one, in which the widow of a patient subjected to thyroidectomy by an osteopath claimed malpractice and was denied damages because she wrongly assumed that the standards of the allopathic school applied. The other, involving an injury to a hand in which it was claimed the defendant osteopath failed to suture cut tendons, with resultant disability, was also denied redress for the same reason.

Among the several reasons leading to the decisions is one which puts the blame squarely on the shoulders of the patient, to wit: "a patient who seeks treatment from an osteopath for the cure or allevation of his condition is charged with knowledge of the fact that the osteopath would follow the methods and practice observed in the osteopathic system of treatment, and is not in a position to complain that the methods and standards of practice customarily observed by another school of medicine were not followed.

With no uniform set of standards for the various systems of practice now legalized by the State, it is incumbent on the patient to inform himself as to the differences that exist, since he alone is responsible for his choice. And the Court has in effect wisely cautioned: let the buyer beware.

*Reprinted from Detroit Medical News.

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"TRAFFIC SAFETY" broadcast, at Station KTKT. "Smokey" Altenberger, guest expert, with Chuck Blower, MC, and Students. (Photo by Sam Levitz).

RADIO HEALTH EDUCATION PROGRAM IN PIMA COUNTY

The proposed Radio Health Education program was fully described in the July issue of *Arizona Medicine*. At that time, it had been accepted as the 1951-1952 project for Public Relations and Health. Pima County Auxiliary, under the direction of Mrs. J. K. Bennett and Mrs. Blair Saylor, has now passed the half-way mark in its radio schedule; we would like to present, here, a few statistics from their complete report, that should be of interest to all Auxiliary members.

During the past fifteen weeks, 120 school children have appeared on the program, representing each Public Elementary School in Tucson, including Davis-Monthan Air Base. Each week, the four scheduled schools have been contacted, reminded of the date, and arrangements for transportation of the participating students have been made. It has been necessary for the Auxiliary to furnish transportation for about sixty of these pupils so far.

The expense of providing Teacher's Manuals was met by the State Auxiliary. These had to be revised, printed and distributed to every 4th, 5th, and 6th grade teacher in the Tucson Public School System, before the beginning of the fall schedule.

When available, sound movies have augmented the teaching material. Nine films have been shown to thirty-six schools, encompassing 4,500 pupils in the participating grades. In many cases the entire school viewed the film. The Department of Radio-Visual Aid of the University of Arizona gave invaluable assistance in the selection of suitable films. Auxiliary members viewed countless films before the final selection of the few that were appropriate to our program. These were then procured from the least expensive source, and in many cases they were donated. It was an overwhelming job for Auxiliary members to secure these films at the proper time, schedule their use by the participating schools, and transport them to and from the schools. This phase of the program alone has disseminated a great deal of health information. The book of radio scripts, provided by the University of Texas, had to be adapted for our use. Some of the topics were

not pertinent to Arizona, so new scripts were written; for example, "Poisonous Creatures of Arizona" was substituted for "Rat Control." Two of the Texas programs were combined, and a special one on the newly organized Visiting Nurse Association was inserted.

Perhaps it is fortunate that the work of this revision was underestimated, for it is probable that we would have thought it impossible to get the scripts and school material ready for use by October 11th, when the first broadcast was scheduled. The Texas format was on a competitive basis. This idea was not acceptable to the School Authorities, so it had to be changed to a regular question-and-answer session. Moreover, there were changes, not only because of different conditions and Public Health Regulations in Texas, but those scripts were written almost exclusively for a rural audience, whereas most of ours is metropolitan. They had an announcer, as well as a Master of Ceremonies, whereas we had only an announcer whose time was donated by Station KTKT, and who had no knowledge or concern with the program other than that of reading his prepared lines at the time of the broadcast—these, incidentally, were "live" instead of previously recorded ones as was the policy in Texas. All of these factors, and many others, had to be taken into consideration but now, of course, our revised scripts are available for any other Auxiliary undertaking the program, so that future changes should be comparatively few and simple.

The Auxiliary was very fortunate in having alert and interested guest experts who carefully screened every script for authenticity. These experts were obtained by the Council of Social Agencies from the Police Department, Fire Department, Public Health Department, St. Mary's Hospital, Y.M.C.A., School Nurses, Red Cross, University of Arizona, and others. Contacts with all these representative organizations have meant good Public Relations. Many of them did not realize that a Medical Auxiliary exists. In addition to this responsibility, the Council of Social Agencies accepted that of mimeographing, where many copies of radio script material or supplementary teaching material were required.

Station KTKT has given us fifteen minutes of free radio time every week, plus tape recordings of three programs which were scheduled during school vacation periods. Cooperation from a radio station is obviously the most vital requirement for the success of the program, and we are especially grateful to Station KTKT for their contribution.

One of the most important features of the project was the distribution of 12,000 printed schedules of the radio program which listed topics, time, and dates of the broadcasts. These bulletins went to every Elementary School child in Tucson. If Junior took his copy home, as he was supposed to do, it was read by 12,000 mothers and, we hope, not a few fathers, which adds up to a lot of people who become aware of the Women's Auxiliary to the Medical Association.

The importance of good publicity cannot be over-stressed. This was very competently handled in Pima County by Mrs. Hiram Cochran. Advertisements of the program appeared in the radio section of the newspapers when the broadcasts first got underway, and news items and pictures were inserted whenever possible.

Pima County faced difficulties which no other Auxiliary in Arizona, wanting to institute the program in its county, would have to meet. Due to lack of time for complete revision of all material before the fall opening of the school year, much of the work has had to be done hurriedly. This preparation should be, and would have been done many months in advance, had the program been approved in time. As a result, Pima County Auxiliary members have learned how to write radio scripts, set up a studio, do a pre-broadcast warm-up with inexperienced, first-time-on-the-radio actors, supply sound effects, and give soundless signals of suggestion or correction to an M.C. unfamiliar with medical terminology. However, these very factors have resulted in a relaxed, spontaneous effect which has enhanced rather than detracted from the "listenability" of the program.

We hope that we have not stressed the difficulties, the work, and the disappointments too much; more than matching them are the satisfaction of knowing that a needed program of health education is started, that many people in the Tucson area listen and approve (judging from comments and correspondence about it), and the Auxiliary has a definite, vital project that *can* grow from a small beginning locally into a forceful means of promoting good Public Relations throughout the state.

This report is confined, as stated, to the activities of Pima County, but it is gratifying to learn, recently, that four out of the five organized counties in Arizona have started, or are planning to start, the radio health education program. Their progress and methods will be covered in our report on the work of all the Public Relations and Health Committees at the end of the year.

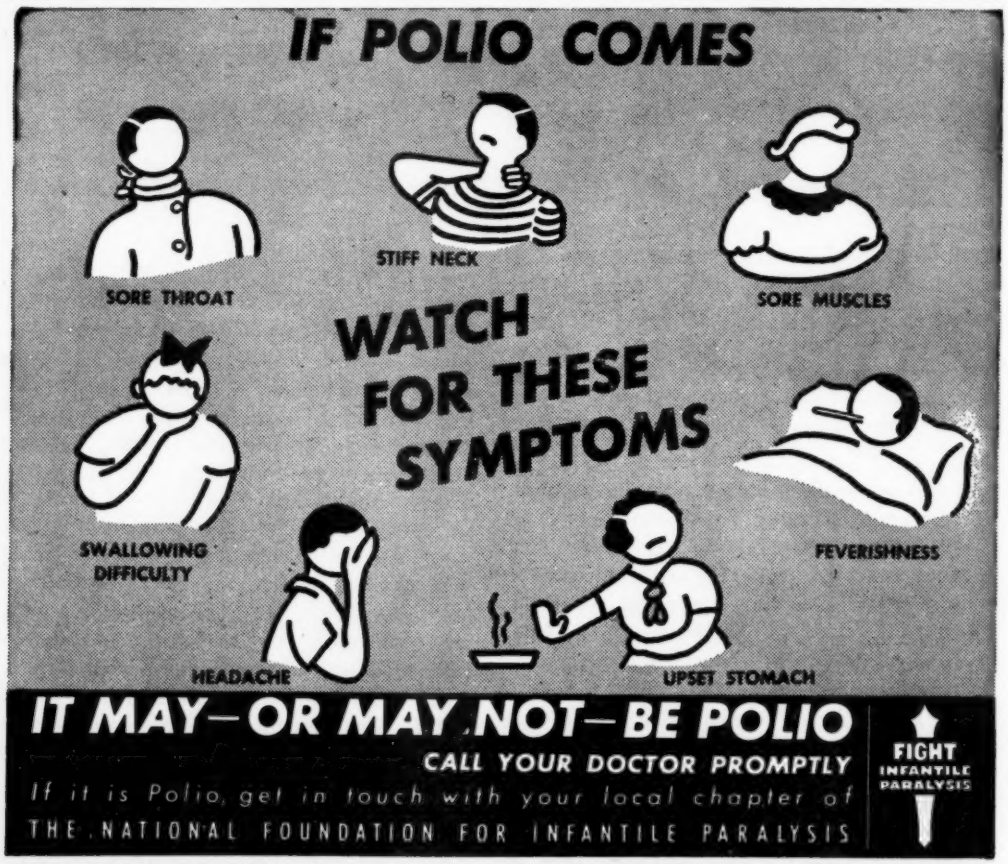
Betty P. Kinkade, Public Relations Chairman,
Anne T. Baker, Health Chairman

COMMISSIONED RESERVE MEDICAL OFFICERS

At the request of the local state headquarters of the Selective Service System, those physicians receiving Commissions in the Reserves of the military forces are urged to immediately, following notification and acceptance of such Commissions, so advise their respective local Selective Service Boards of this fact; otherwise, these boards have no knowledge thereof and would normally proceed to call physicians for induction on the basis of current classifications. Cooperation to this end is sought to eliminate much unnecessary confusion on the part of both concerned.

PERSONAL NOTE

Dr. Henry A. Siegal, 1109 Professional Building, has been elected to Fellowship in the newly organized American Academy of Obstetrics and Gynecology and will be listed as one of the Founders of the Academy.



HERE ARE SYMPTOMS OF POLIO listed by the National Foundation for Infantile Paralysis. They may—or may not—mean polio. Call your doctor and then, if help is needed, contact your local chapter of the National Foundation. When polio is around, these precautions are recommended: Keep children with their own friends and away from people they have not been with right along. Don't become exhausted through work or hard play Don't stay in cold water too long or sit around in wet clothes. Avoid becoming chilled. Always wash hands before eating.